THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

VOL. XVIII No. 433—21st YEAR.] LONDON, MAY 25, 1869. [Subscription per Ann. { 15s. in Advance / 18s. Credit.] TREBLE No. 1s. 4d. Unstamped.

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9746 cubic feet of gas per ton of coal.
26-candle gas.
13¼ cwt. coke per ton of coal.
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Patentees of the Standard Gasometers for the Government, and of the
IMPROVED DRY GAS-METERS.
These Meters are warranted to measure correctly and not to vary, and have come into general use more rapidly than any Meters hitherto manufactured.

PARIS EXHIBITION, 1867.
THE TESTING-HOUSE REPORTS.
The Reports prepared for the Science and Art Department, under the direction of the Lords of the Council, detail the arrangements made for testing the gas apparatus exhibited. In the testing-house erected by the Special Committee appointed to further this object a gasholder was constructed by Mr. G. Glover, being a *fac simile* of that produced and patented by him in 1859, and deposited in the Exchequer, under the provisions of the Sales of Gas Act, and British manufacturers of gas apparatus were invited by advertisement, and by direct application, to forward worthy objects for exhibition. Mr. G. Glover was, however, the only manufacturer who sent Meters to be tested. The report states that, as "Mr. Glover is a manufacturer of Dry Meters only, no opportunity presented itself of comparing their accuracy with that of Wet Meters under various circumstances, but the perfection to which that maker has brought his Meters prevents the possibility of those extravagant errors which are well known to exist where Wet Meters are used."
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Original Manufacturers of Wrought-Iron Gas Tubes and Holders of the present Patents; Inventors and First Makers of LAP-WELDED FLUES for Steam Boilers.
J. R. and Co. make all kinds of Tubes and Fittings for Gas, Steam, and Water, and the largest Orders may be executed in a few days.
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Ports of Shipment, in the Firth of Forth.

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The Proprietors will, in future, use their own forms of bills of lading, and also issue certificates of origin, signed, as the case may be, either by JAMES FERGUSON & Co., or by the NITSHILL & LESMAHAGO COAL COMPANY; and they request all consumers purchasing Lesmahago Coal to demand such a certificate for each cargo, and to observe that it corresponds with the bill of lading.
Auchinheath, Lesmahago, March, 1868.

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Patentees of the Standard Gasometers for the Government,

TWO MEDALS,

LONDON, 1862.

HAVE OBTAINED THE

HIGHEST

PRIZE

FOR

SILVER MEDAL,

PARIS, 1867.

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AT THE

PARIS EXHIBITION.

RANELAGH WORKS, RANELAGH ROAD, PIMLICO, LONDON, S.W.;
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JOURNAL OF GAS LIGHTING THREE NEWSPAPER

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SILVER MEDAL, PARIS EXHIBITION, 1867.

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For Gas, Steam, Water, &c.

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the Coating of which does not shell off, is a certain preservative from rust, and resists all effects of expansion and contraction.

LAP-WELDED IRON & HOMOGENEOUS METAL TUBES

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Boiler-Tube Ferrules, Gun-Metal Gland Cocks, Water-Gauges, Whistles, &c.; Stocks, Taps, and Dies for Screwing, and Gas-Fitters Tools of all kinds.

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PATENTS FOR CHARGING AND DRAWING GAS-RETORTS,

WITH CHAMBERS FOR MOUTHS,

REQUIRING NO LUTING.

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The Directors of the Alliance Gas Company have kindly consented to give every facility to gentlemen desirous of seeing the invention in operation. Parties, therefore, about to visit Dublin will be so good as to send us their card, and we will furnish them with letters of introduction.

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1862.

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CLASS II.

MADE ONLY BY

GEORGE HALLETT & CO.,

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It is not discoloured like white lead in a sulphuretted atmosphere, nor washed off like white zinc; and its light colour reflecting heat, produces much less expansion of gas in holders painted with it than with dark colours, besides rendering them much more sightly. Its specific gravity is so much below white lead that the same weight will cover one-third more surface, while it is equal in body; and its price being about the same (30s. per cwt.), it is actually one-third cheaper. From experience, its manufacture is greatly improved, and it is quite suitable for all purposes in which white lead is employed.

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N.B.—Antimony Paint, COVERING SO MUCH MORE WORK, costs about 20s. per cwt., as compared with White Lead at 30s. per cwt.; a similar economy arises from its use in Steam and Gas Joints, for which purpose it is superior to White Lead.

J. & J. BRADDOCK,

GAS ENGINEERS,

GLOBE METER-WORKS, OLDHAM,

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IMPROVED CONSUMERS GAS-METERS,

Of the Best Material and Workmanship, carefully adjusted to the requirements of the British Sales of Gas Act and Foreign Standards of Measures.

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Which are uniform with the Ordinary Meters, and register with minute accuracy.

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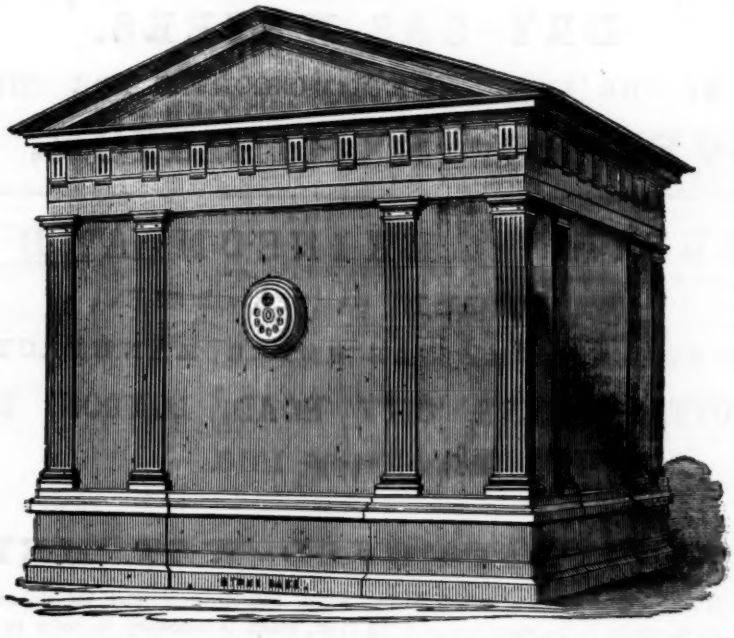
IN BEST TINNED IRON CASES.



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All sizes of CONSUMERS METERS generally in Stock.

STATION-METERS, in round or square cases, on the Shortest Notice.

THE

UNIVERSAL EXHIBITION OF PARIS,

1867.

SILVER MEDAL.

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DRY GAS-METERS,

BY THE IMPERIAL COMMISSIONERS FOR THE

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(SUCCESSORS TO SAMUEL CROSLEY),

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Established 1816.

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W. P. and Co. invite especial attention to this Meter, which entirely overcomes the difficulty to which ordinary Wet Meters are subjected, owing to the short range of the Float, which is necessary, in order to meet the requirements of the Sale of Gas Act.

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STATION-METERS AND GOVERNORS.

Which can be seen at all the London Gas-Works. Also Liverpool, Manchester, Sheffield, Nottingham, Belfast, Glasgow, Birmingham, Dublin, Bristol, Leeds, Leicester, Brighton, Southampton, Sunderland, Wolverhampton, Bradford, Norwich, &c., &c.

TEST GASHOLDERS, EXPERIMENTAL METERS, EXHAUSTER REGULATORS,

MINUTE CLOCKS, PRESSURE GAUGES, PHOTOMETERS, PRESSURE REGISTERS, &c.

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TO CORRESPONDENTS.

No notice can be taken of anonymous communications. Whatever is intended for insertion, must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.

NOTICES.

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The next number will be published on Tuesday, June 8, and the subsequent numbers on each successive alternate Tuesday.

Stamped copies, when forwarded by post, must be folded so as to expose the stamp; they are otherwise liable to the full postage charge for letters.

This JOURNAL has been duly registered at the General Post-Office for transmission abroad.

All communications for the Editor to be addressed, "No. 42, Parliament Street, Westminster;" and all remittances for subscriptions or orders for advertisements to the Publisher, No. 11, Bolt Court, Fleet Street.

THE JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, MAY 25, 1869.

Notes upon Passing Events.

THE Corporation of London have apparently lost that skill in pageantry they once possessed. This is not in the spirit of the age, for, what with the liberty of costume, and what with the fashion of beards, painters can no longer complain of the unpicturesqueness of modern dress. Chimney-pots have given way to wide-awakes, and formal broadcloth to velvet jackets, knickerbockers, and coloured hose; in fact, a painter may have his men as well dressed as Vandyke painted them, and his women as Watteau or Boucher. The Corporation had a grand opportunity of devising an imposing procession, with the banners of all the City companies; the bands of all the volunteer regiments; the aldermen, common councilmen, and officers, in their robes, supplemented by the recently authorized court-dress of velvet. The occasion would have been found by uniting the opening of Blackfriars Bridge and Holborn Viaduct—both settled to take place in July—in one grand ceremony, extending from one monument of art and utility to the other, and showing their close commercial connexion. Unfortunately, local, or rather sectional jealousies have prevailed. The two chairmen of the Bridge and the Viaduct Committees cannot consent to halve honours on one day like the ever famous Kings of Brentford. Each claims a whole day to himself, and the two committees, as we are told, will not consent to joint-stock the preliminary luncheons and small patronage incident to the preparation of so great an affair. What a pity! Even if royalty can be twice allured into the City, who can ensure two fine days? The chairmen will probably draw lots for choice, and the one who does not get the royal bean will have a grievance for life. Such are the fruits of the small jealousies of small people in a very important matter for one day!

The farmers of the present day are a very different race to their fathers, and the present Parliament is beginning to find this out in earnest, especially as regards Scotland. There the farmers, in the counties where the farms are large and the tenants rich and educated, have banded themselves together with success to resist the previously overwhelming influence of territorial magnates. Scotch landed proprietors, as a body, are poor. They, therefore, like rich tenants, who will pay large rents in one lump. But what they have gained in convenience and income they have lost, or begun to lose, in power. In the grouse and deer districts of Scotland there are two rents—the rent of the soil and the rent of the game. According to the correspondence in a leading sporting paper, the rent of the game often exceeds the rent of the soil. The farmers object to this, and object to the game laws, although they are much milder than in England. This was of no consequence so long as landlords returned all the county members, but at the last election they lost a great many votes. This is not the whole case. In England and Ireland the law of distraint for rent exists for the protection of the landlord, and some political economists think that this law is too hard, although it is difficult to see what could be substituted for it. But in Scotland the landlord has much more security in the law of *hypothec*, under which he can follow grain or stock, and seize it even in the hands of a *bond fide* purchaser. This law enables landlords to trust men of small capital or borrowed capital with leases, and so increases the competition that raises rents. Against the law of *hypothec*, what may be called the political union of Scotch farmers is banded, and in the competition for their votes the farmers have obtained powerful political support; for the Scotch farmers have long leases, and are proportionately independent. All this agitation is a sign of the times. The landlords now deplore the step they have taken in abolishing peasant cultivators—*Scotice* "crofters"—and superseding the small dependent farmers by wealthy tenants on long leases. Some wildly threaten to farm their own estates themselves—an undertaking requiring, on arable farms, some knowledge and a good deal of money; others recommend a return to a system of tenants-at-will. As, however, Scotch landlords require rents punctually paid, and as the House of Commons is in the habit of letting the Scotch members transact their own business, the Scotch game laws and the law of *hypothec* are both in danger. Yet if the anti-game law advocates had all their own way, and all the rich Southerns—merchant manufacturers and professional men—who now spend money like water on Scotch shooting, were disgusted into migrating to other forests and moors, it may be doubted whether Scotland, as a whole, would not feel the want of a very large annual expenditure, now absorbed silently as a matter of course. In England the farmers are equally dissatisfied, but much less powerful politically. They have shown their strength and weakness in a Bill brought in by the Government for establishing County Financial Boards, to be composed of a certain elected minority of members, to act with the *ex officio* magistrates. In Parliament it is assumed that the management of the county magistrates has been economical and business-like; but this general consent to treating the question of non-representation in county taxation as a sentimental grievance is confined to the House of Commons. In private society, and at their clubs, farmers have a rich budget of stories to tell of the administration of Quarter Sessions, by no means composed of landed proprietors. The most active members of the bench are often clergymen, retired barristers, who never held briefs, and half-pay officers, in whom good county connexions replace the qualification of broad acres. Unpalatable as it is, the Financial Board will pass. Country gentlemen grumble that farmers wish to enjoy the pleasures of proprietorship without the responsibilities. This complaint is scarcely well founded, but it is a foreshadowing of what is to come. The English farmers cannot return their men for

counties as the Scotch did; they have only one representative in the House—one farmer, pure and simple—but they have acquired sufficient political power to make county members every year more civil, more attentive to either reasonable demands or unjust prejudices. Thus it comes to pass that the English game laws are threatened as well as the Scotch, with much more reason, but in a much less formidable manner. Tenancy from year to year, on land let much below its value, is the great source of influence of the English landlord. He gives his land cheap, and on terms unfavourable to the investment of capital. In return he expects, whatever be his politics, political conformity, and generally gets it at the hustings. But the farmers of the present generation are unlike their fathers in every respect. The old-fashioned farmer was to be known by his manners, his dialect, his costume; just as the old-fashioned squire was to be distinguished in Queen Anne's time from the courtier. Now, if it be not for a little difference in complexion, the squire, the big farmer, and the thriving merchant, look and speak, if they do not think, very much alike. So what with reading, travelling, and talking, the farmers begin, in nurses phrase, "to feel their feet," from which sensation political landowners find at present great inconvenience. The end may be, that what the English landlords lose in power they will—more fortunate than the Scotch landlords—gain in rent.

The really formidable agitation against the game laws comes from tenant-farmers, as does the claim to control the taxation of English counties. The protests—they have not reached the importance of agitation—against great and in favour of small estates, with which the demand to increase the succession duties on freehold estates and to abolish the law of primogeniture are connected, are sentimental grievances not entertained amongst any classes in purely rural districts. The law of primogeniture, which hands down a freehold estate unbroken, while it divides—that is, sells—a leasehold for ninety-nine or nine hundred and ninety-nine years, cannot be defended on any logical principle. Neither can the justice of taxing personalty, including leaseholds, so much more highly by succession duties than freeholds, except on the ground of the heavy local taxes borne by land—from which, by-the-by, leasehold is not exempt. Without entering now into the vexed question of the comparative value of large and small estates, of great landlords, peasant proprietors, or small farmers, in an economical or—which is quite a different thing—a moral and social point of view, we think it well to call attention to the fact that the measures most warmly advocated by those who are most hostile to the great landlord system are just those which would make a peasant proprietary more rare than it is at present. Already the recent increase of the succession duties on land has fatally sapped the Cumberland statesmen, the little band of freeholders who had survived the taxes of the war with the French Republic and Empire. Increase these taxes, and the freehold yeoman proprietor will disapppear under a load of debt. Mortgages and lawyers costs will eat every little farm, and increase the temptation to turn the value of land to the profits of trade. The abolition of the law of primogeniture will not affect the educated class, who make wills and settlements, excepting by accident; but the yeoman and cottage landowners will feel its effects at once, and their sons will migrate to towns or emigrate to distant lands. When we examine the condition of our agricultural labourer, we cannot but feel dissatisfied—deeply dissatisfied; but when we see the comfort and improvements that prevail on the estates of some of our greatest landed proprietors, and compare it with the wretched state of agriculture, and social misery, and ignorance, hopelessly prevailing in certain continental states more favoured by climate—when we see acres of Westminster rebuilt without a Haussmann or his taxes—we cannot desire to see landed estates infinitely divided by a compulsory law. No other law with English tastes would do it. The wages and profits of a trade are an irresistible temptation to a race which almost universally desires and prefers meat and broadcloth to a smock-frock, lenten fare, and money in the savings bank. The picture every one would like to see transplanted to England is the peasant frugal and independent, successfully cultivating with the aid of his family; but this is seldom seen out of vine-growing countries, except where privations are cheerfully enjoyed, which would in England be considered tortures. The correspondent of the first agricultural journal of France, writing from the department of the Gironde, gave an account of the condition of a country of peasant proprietors, that could hardly be more gloomy if it were taken from the worst parish in the low-wage districts of the West of England. He heads his paper, "The Depopu-"lation of the Rural Districts." He begins by asking, "What "will become of agriculture without peasantry?" Then, after proving, in a way that convinces no intending migrant, that the daily earnings of a farm afford more regular resources than the occasional high wages of the city, he proceeds to argue that the occult influence which induces so many peasants to abandon agriculture and settle in towns, is what he calls "domestic insubordination." The French father has lost the authority over his children that he once possessed, and is no longer master in his own house. As soon as sons are as strong as their father they cease to obey him, and as soon as they can excel him they claim to give him orders. "Not "content with shaking off the yoke of filial obedience, they "seek to impose it, and heaven only knows with what tyranny "the young seek to rule the old." If the father, under compulsion, takes the son into partnership, peace may, perhaps, be maintained until the son takes a wife, and the entrance of a daughter-in-law makes life in common impossible! "Thus "it comes to pass that, in rural districts, *you see families con-"fined to the smallest possible numbers—a husband, a wife, and "at the utmost two children.*" For one monstrosity produces another: the husband, sure to find in his son less help than masters, assigns narrow limits to the fecundity of the nuptial couch. "Formerly—I do not speak of times long past—you "found on every farm, or *métairie*, three or four generations of "labourers. How is it that, when partnership and association "are doing such wonders, they have departed from peasant "families?" This is not a picture by an English hand; it is painted by a Frenchman in view of his native country—according to some of our politicians, the paradise of peasant proprietors.

The Corporation of London have the great merit of fidelity to their officers, when once they obtain the full confidence of the Common Council. Mr. Charles Pearson was almost a genius, and a thick-and-thin supporter of the Corporation; in return he has most munificently paid, and allowed to pay, himself in a very odd, not to say irregular manner, as may be seen in the original documents connected with the Great Central Gas Consumers Company and the Metropolitan Railway. A report from a committee, on the office of the Chamberlain of London, shows that Mr. Scott's talents and zeal are not less appreciated than those of Mr. Charles Pearson. He has acted as banker for the City of London, investing, and perhaps speculating with, the floating balances in his hands with such success as to have realized for the Corporation a net profit, within the last ten years, of more than £30,000. Under these circumstances the committee recommended that the Chamberlain's salary should be increased to a maximum of £2500 a year, with a minimum, as before, of £1500, and a bonus of £2500. It seems probable that the committee were not ungrateful for that pamphlet in which, by figures of very imposing appearance, Mr. Scott proved, to the perfect satisfaction of the Common Council, that in their body only no reform was needed. We cannot help missing from this formal report all account of the way in which an unstated amount was invested to produce these profits, because, if it be safe and sound, the Chancellor of the Exchequer might take a leaf from the Chamberlain's book. At any rate, the result reflects great credit on Mr. Scott's probity. It was generally understood that he had a large share in those unfortunate undertakings, the Bank of London and the Imperial Mercantile Credit; yet, while he lost his own funds, he has managed, according to the balances given by the committee, not only to save the capital but secure profits for the Corporation.

ON THE STANDARDS OF COMPARISON IN TESTING THE ILLUMINATING POWER OF GAS.

The attention of the Institution of Civil Engineers and of the Society of Engineers has been recently directed to the importance of obtaining some reliable standard of comparison with which to test the illuminating power of gas. On the 13th of last month Mr. Kirkham read a paper to the members of the Institution, entitled "Experiments on the Standards of Com-"parison employed for Testing the Illuminating Power of "Coal Gas;" on the 9th and 16th of the same month papers were read by Mr. Hartley, before the Society of Engineers, "On the Methods employed in Determining the Commercial

"Value and the Purity of Coal Gas;" and on the 3rd inst. a paper was read by Mr. Sugg, before the same society, "On Gas-Burners."

Of these interesting communications on this important subject we subjoin the following copious abstracts, commencing with Mr. Kirkham's, whose experiments indicate a difference of upwards of 2 candles in the illuminating power of the same gas, caused by the variations in standards of comparison:—

Mr. Kirkham observed that the standards of comparison at present in use were known to be wanting in that uniformity of result necessary for determining with accuracy the difference in the intensities of two lights. But as the amount of the variation had never been clearly defined, the author had instituted a series of experiments for the purpose of ascertaining the extent of these differences. In France, the photometer employed was M. Foucault's modification of Count Rumford's, as arranged by MM. Dumas and Regnault; while the standard of comparison was the amount of light emitted from 10 grammes of colza oil, specially prepared and verified, burning in a carcel lamp, of certain fixed proportions, at the rate of 42 grammes (648 grains) per hour; and it was required that the light produced by from 25 to 27½ litres (·8625 to ·9707 of a cubic foot) of gas, consumed in a Bengel burner of known dimensions, should be of equal power. The mode of conducting an experiment with this instrument was then detailed; and it was explained that during the progress of the experiment, the quantity of gas was regulated, so that the two lights should be maintained of equal intensity. In this way it was possible to compare the consumption of oil with that of the gas, and if the lamp had burned at the specified rate of 42 grammes (648 grains) per hour, the experiment should have been completed in 14 minutes, 17 seconds. In England, the instrument in use was constructed on the Bunsen principle, and the standard of comparison, as defined by Act of Parliament, was a sperm candle, burning at the rate of 120 grains per hour. The gas being consumed at the rate of 5 cubic feet per hour, through an Argand burner having 15 holes, and with a chimney 7 inches high, must be equal, in intensity of light, to 12 such candles. The instrument by means of which the experiments were made by the author was also constructed on the Bunsen principle, combining all the most approved modifications. It consisted of four photometers, radiating from a common centre in the form of a cross, and each accurately scaled, adjusted, and fitted with every appliance to ensure uniformity and precision. The first series of experiments was undertaken for the purpose, if possible, of arriving at the amount of variation in the illuminating power of candles obtained from the principal manufacturers. Gas was adopted as a standard of comparison; and to ensure uniformity in its illuminating power, a sufficient quantity for carrying out the experiments on each occasion was put into a gasholder in the laboratory, the temperature in the latter being always maintained at 62° Fahrenheit. In this series, each of the four photometers was supplied with candles of a particular make, to the use of which it was restricted throughout the day, every successive experiment being made with a separate specimen. All the candles were cut in half and burned from the centre. It was observed that, although the standard candle was fixed by Act of Parliament as a sperm candle of six to the pound, burning uniformly at the rate of 120 grains to the hour, yet no such candle was to be obtained; for from various quantities of sperm candles, six to the pound, procured from several manufacturers, the average rate of consumption was 135 grains. This fact had been previously demonstrated by the extended series of experiments carried out by Professors Graham, Leeson, Brande, and Cooper, in 1852. The parliamentary rate, being abnormal, was so rarely met with, that all operators had been compelled to make corrections for these variations, and had unanimously adopted the ordinary rule of simple proportion for the purpose. It was proposed, therefore, in the analysis of the diagrams exhibiting the results of the experiments, that the candles burning at the rate of 135 grains should be designated "normal "standard candles," to distinguish them from the parliamentary standard of 120 grains. Commencing with experiments Nos. 56 and 58—in No. 56, with a consumption of 119 grains, the illuminating power of the standard gas was represented as 15·3 candles; whilst in No. 58, with a consumption of 121·2 grains, it was 14·5 candles. The difference between these two experiments, made with candles which happened to be nearly within the parliamentary standard, was ·8 of a candle. In experiment No. 51, burning the normal standard quantity of 135 grains, the same gas was represented as being 15·48 candles; and in No. 61, consuming 134·4 grains, or ·6 of a grain less, it was 16·28 candles, the difference being in this case also ·8 of a candle. In experiment No. 60, with a consumption of 134·7 grains, or only ·3 of a grain more, the gas was shown to be 18·18 candles, a difference of 2·70 candles. In experiment No. 51, with a consumption of 129 grains of sperm, the gas had an illuminating power of 12·6 candles. In experiment No. 52, with a consumption of 145·2 grains, the gas appeared to be 12·6 candles. Experiment No. 52, with a consumption of 157·2 grains, gave the gas as 12·54 candles. The last three experiments were examples of candles consuming different quantities of sperm, yet giving practically the same amount of light; the correction of which to the parliamentary standard of 120 grains created error. Experiments Nos. 57 and 54, each with the same consumption of 130·2 grains, showed the difference in the illuminating power of the gas to be 2·42 candles; the former representing it as 13·02, and the latter as 15·44 candles. These were examples of candles burning the same quantity of sperm, yet giving a different amount of light. The greatest difference in the illuminating power of the "standard gas," as shown throughout the forty-four experiments made upon this day, was 4·60 candles; being between experiment No. 51, with a consumption of 129 grains, giving an illuminating power of 13·58 candles, and experiment No. 60, consuming 134·7 grains, representing the gas to be 18·18 candles. An examination of the various diagrams would demonstrate that the differences in the candles might be classed under five heads, viz.—First, differences in the illuminating power of parliamentary standard candles, burning at the rate of 120 grains per hour. Secondly, differences in the illuminating power of normal standard candles, burning at the rate of 135 grains per hour. Thirdly, candles with different rates of consumption, giving the same amount of light. Fourthly, candles with the same rates of consumption, giving a different amount of light. And fifthly, greatest differences of illuminating power, in the whole number of experiments, when corrected to the parliamentary standard. From the tabulated results of three other sets of experiments, it appeared that, in the first, when the consumption of sperm varied from 109·2 to 134·4 grains the greatest difference in the illuminating power of the gas, corrected to the parliamentary standard, was 4·59 candles; in the second, when the consumption ranged from 120·9 to 130·8 grains, the difference in the illuminating power was 3·06 candles; while in the third, with a consumption of from 120 to 142·5 grains, the difference was 4·21 candles. The second, third, and fourth series of experiments were made with candles obtained from one manufacturer only. As an example of the results arrived at by the second series, it was stated that with a consumption of sperm varying from 129·6 to 130·2 grains, the greatest difference in the illuminating power was 2·26 candles. The third series of experiments was made for the purpose of ascertaining whether the French standard of comparison, when used at a photometer on the Bunsen principle, was more reliable than the candle. It was thus found that when the lamps were allowed to burn without any regular system of trimming, the variations were about as great as those of the candles; but when the lamp was trimmed before the commencement of each experiment, the variation was about the same as with the best candles. It was probable that the results would have been better, if the time allowed for taking the observations had been fifteen minutes instead of ten minutes; for the lamp when filled weighed 10 lbs., and the balance employed would not turn to less than a grain. Subsequent experiments corroborated this supposition. Of this series the examples selected showed, in one case, that the greatest difference in the illuminating power of the gas was 1·69 candle, with a consumption of sperm ranging between 136·5 and 124·5 grains. In another case the greatest difference in illuminating power, corrected to the standard consumption of 108 grains of oil in ten minutes, shown in the whole number of experiments, was 2·3 candles, when the time required for the consumption of 108 grains of oil by the lamps was respectively 9 minutes 39 seconds and 10 minutes 3½ seconds. For several years past the author had had in operation one of Mr. Lowe's jet photometers, for the purpose of indicating the illuminating power of the gas as it was being manufactured. As its apparent accuracy seemed to promise a more reliable means of determining the illuminating power of gas, it was decided to carry out a fourth series of experiments, with a view to discover the relation between the indications of

this instrument, and those of the French and English standards. At the "Cross" photometer, three consecutive experiments were made upon the quality of the gas, compared with four candles burning at the same time. The results of these twelve experiments were then averaged, and accepted as the illuminating power of the gas in each case. Another operator was at the same time engaged at the Dumas and Regnault photometer, and the average of these experiments was also taken as representing the illuminating power of the gas. Two of Mr. Lowe's jet photometers, fitted precisely alike, were in operation throughout these experiments; the orifice in each jet being of the same size, so that at any given pressure the height of the flame from each would be the same. The pressure at the point of ignition was regulated so as to give a flame exactly 7 inches in height, and that pressure was duly recorded. The height of the flame at a pressure of ·6 of an inch was also observed, as well as the time required for the issue of ·1 of a cubic foot of gas under each of these pressures. A diagram was prepared, showing the results of simultaneous experiments for ascertaining the illuminating power of gases of different qualities, by two different systems, as at present existing, and by the proposed plan of testing by the jet. On this diagram a diagonal line had been drawn, which illustrated the theory of ascertaining the illuminating power of gas by means of the jet photometer, worked on the "retrograde system," which might be thus stated:—Maintaining a 7-inch flame from an orifice of certain fixed dimensions, the illuminating power of the gas was in direct proportion, inversely, as the pressure. This diagonal line being considered as the "standard 7-inch "flame," according to the theory just advanced, it was observed that the average results of twelve experiments very nearly coincided with the theory; and at pressures of ·45, ·51, ·63, ·64, and ·68 of an inch this was especially the case. The highest and the lowest candle experiments were completely cut by the line, and the lamp experiments also tended generally to prove the theory. Another diagram, representing the duration test corresponding with the retrograde scale, showed the time required for the issue of ·1 of a cubic foot of gas, of a certain illuminating power, maintaining a 7-inch flame from the jet photometer. The use of the duration test was to check the working of the jet photometer, and to afford a means of discovering any irregularities that might occur in the apparatus. As an example of its use, it was seen by the retrograde scale that gas having an illuminating power of 14 candles gave a 7-inch flame at a pressure of ·63 of an inch; and upon referring to the duration test it would be found that ·1 of a cubic foot of gas of that illuminating power ought to maintain that flame for three minutes. Should there be any considerable deviation, it was an evidence of some derangement in the apparatus. From these experiments the author believed it was evident that a more reliable method than that at present in use, for determining the correct illuminating power of the gas supplied to the public, was urgently needed; and he thought the following system would be found to give results approaching as nearly as practicable to a truthful estimate:—Let the illuminating power of the gas be determined by the aid of the present recognized photometer, fitted with a carcel lamp, burning oil of the same quality, and verified in the same manner, as that adopted by the municipality of Paris as a standard; and let a sufficient number of experiments be made, so as to cover the errors that were known to exist, and the average of these be compared with the illuminating power, as shown by the jet photometer and the duration test, and then the "mean of "comparison" might be taken as the illuminating power of the gas.

A considerable portion of Mr. Hartley's first paper was occupied with the consideration of the effect of different kinds of burners on the illuminating power of gas. The conclusions deduced from the experiments of Christison and Turner, forty years ago, comprised, it was said, all that is yet known respecting the principles which should govern the construction of gas-burners, which principles were thus summarized:—

1. That up to a certain maximum consumption for each burner the light increases in a much greater ratio than the consumption of gas.

2. That for each burner there is a certain size of flame which is most economical—a corollary of the first proposition.

3. That in Argand burners the size of the holes and their distance from each other is of the utmost importance. The holes should be so near to each other that the flame unites at its base. For gas of specific gravity ·550 to ·650, the holes should be 1-32nd of an inch in diameter, and about 12-100ths of an inch apart. For gas of a higher gravity, the holes should be 1-50th of an inch in diameter.

4. That the size of the central aperture of an Argand exercises an important influence on the amount of light yielded.

5. That the greatest amount of light is obtained when the flame becomes tinged with yellow, and is near to the point of smoking.

6. That the glass chimney should be proportioned to the size of the burner and the consumption desired.

7. That consumers, generally, cannot burn the gas in such manner as to produce the best effect, on account of the liability of the flames to smoke.

Among the teachers on the subject of gas-burners were mentioned Clegg, Peckstone, Alex. Wright, Lewis Thompson, Dr. Letheby, and Henry Bannister. Alex. Wright stated that of burners equally suited for the gas, and consuming it at the same rate, the most advantageous is the Argand, next the bat's-wing, and then the fishtail. That the larger the quantity of gas properly consumed in a given time from a burner, the greater is the light given per cubic foot. That the best results arise with a well-formed but flagging flame, and the worst with an irregular, wire-drawn flame. Lewis Thompson said in 1851, every burner has (1st) a certain fixed amount of gas which it will consume to advantage; and (2nd) gives its maximum effect where the flame is on the point of smoking. That the quantity of light is greatest with the Argand, and the intensity with the fishtail. Poor or common coal gas should issue more gently than rich or cannel coal gas, and from burners with larger holes than those for the latter gas.

The yellow-tinged flame, the flagging flame, and the gentle current, all mean the same thing—viz., low pressure; and MM. Dumas, Regnault, Audouin, and Bérard, have established as a general law, "that the greatest illuminating power is "obtained with low pressures, and the maximum light with "pressures equal to ·079 to ·12 of an inch head of water." They further state that bat's-wing burners of the same diameter, burning the same quantity of gas, yield more light when the slits are wide—1-36th of an inch gave them the best results. The diameter of the burner should be proportioned to the desired rate of consumption, but is less important than the width of slit. That single jet burners are very disadvantageous. That a fishtail is not much superior to two single jets, with holes of the same diameter, if the holes be very small. That the fishtail is generally inferior to the bat's-wing. That Argand burners, of almost the same appearance, may require to burn double the quantity of gas to give the same quantity of light, which is dependent upon—1st, the width of the jet-holes or slit; 2nd, on the number of holes; 3rd, on the actual and relative dimensions of the apertures by which air gains access to the interior and exterior parts of the flame; 4th, on the height of the chimney. The first three conclusions accord with Christison and Turner. As to the fourth, an increase in the height increases the consumption for the same light. An 8-inch chimney as against a 10-inch one was 5 to 7 per cent. more advantageous.

After referring to the standard burners prescribed by Parliament, and noticing that flat flames emit rather more light from the side than the edge, Mr. Hartley proceeded to consider the standard of comparison. The sperm candle, he observed, is a very defective standard. It is difficult, if not impossible, to obtain candles of uniform quality both in respect to the sperm and the wick. It is rarely that a candle burns at so low a rate as 120 grains per hour, and hence a standard light is rarely obtained. Neither was he inclined to place more confidence on the French standard of comparison. He stated that he had made hundreds of experiments with the carcel lamp and colza oil, and, in his opinion, it forms a worse standard even than the sperm candle. Various schemes, he observed, have been proposed for the production of a standard light, the most promising of which is due to Mr. Keats, who proposes to use a modified and specially constructed moderator lamp, under special conditions, burning sperm oil at the rate of about 750 grains per hour. He thus secures a very close approximation to regularity of consumption and of light, the value of which is equal to 10 sperm candles; the details of which arrangement were published in the Journal of Gas Lighting, of March 16, 1869. Mr. Hartley then explained the photometers used in France and in England, and thus described the proceedings in a photometrical experiment:—Several sperm candles are cut

into halves, and the wicks of the lower halves exposed by cutting away a portion of the sperm. The wicks are all lighted, and the candles allowed to burn in a place free from draughts, until a well-formed wick is, in each case, attained. The candles are then all carefully extinguished, by touching the tops of the wicks with a piece of sperm and immediately blowing out the flame. The candles are then ready for use. Those which burn irregularly, or appear of inferior quality, are rejected. The gas is turned on to the burner and lighted, and the consumption adjusted by means of the governor and micrometer cock to 5 cubic feet per hour, time being taken by the minute clock. The candles are next lighted with special precautions to preserve the wick well formed. They are nearly counterpoised in the balance, and when the candles have consumed so much sperm as to become lighter in weight than the counterpoise, and the balance just turns, the time is taken to a second by the aid of the clock. A weight is placed in a candle-holder pan equal to the standard quantity of sperm due to the time it is intended to make observations; for ten minutes, the weight would be 40 grains for two candles. Then comes the actual photometric experiment, which consists in moving the saddle to a position on the rod, in which both the reflected images of the sides of the screen appear equally illuminated. A reference to the scale on the rod gives the illuminating value of the gas-flame as compared with two candles. One such observation is made for each minute, and the mean taken as the observed value of the gas. A watchful eye is kept upon the balance during the ninth minute, and when it again turns the time is taken as at first. The difference between the times is, of course, the time occupied in consuming 40 grains of sperm. Another method is to weigh the candles, then light them promptly at any observed minute, use them for the complete minutes, and then suddenly extinguish and re-weigh; the difference is the number of grains burned in ten minutes.

Mr. Hartley observed that the gas referees had laid down a condition that no test of illuminating power is to be recorded in the City testings in which the candles vary more than 5 grains each per hour from the standard rate of 120 grains per hour; but he said his experience leads him to doubt whether sperm candles can be regularly produced by any means which will comply with this requirement.

Mr. Hartley's second paper, read at the meeting of the same society on the 9th of April, was directed almost entirely to the methods of testing the purity of gas; but towards the conclusion of the paper he referred to the imperfections belonging to the present system of gas-testing, and spoke of the jet photometer, which had been proposed as a measurer of illuminating power. The value of the instrument, he said, depended on a thoroughly established fact—viz., that the length of a jet flame, burning under a constant pressure, varied with the quality of the gas. He admitted the correctness of the principle and the value of the instrument to gas-makers, but on several grounds objected to the jet photometer as a measurer of the commercial value of gas. Its indications would have no significance to the public, while the present system of photometry is quite significant, whether the standard of light be a candle or a lamp.

Mr. Sugg's paper, read before the Society of Engineers on the 3rd inst., though not bearing directly on the question of standards of comparison, showed very forcibly the important influence on the illuminating effect of gas produced by the use of different burners, and that the variations in the illuminating power of the same gas are far greater than the differences in the "standard" candles, according to the conditions under which it is consumed. Accompanying the paper were tables showing the illuminating power in candles of the gas consumed by different kinds of Argand, fishtail, and bat's-wing burners, such as are in use by consumers in London and the provinces, as compared with gas consumed with Dr. Letheby's standard burner. In this paper Mr. Sugg took into consideration the various kinds of burners which have been contrived since the Argand gas-burner of Clegg and Grafton in 1841, on which he is inclined to think there has been but little improvement in the principle of construction. The uncertainty of getting two burners alike induced him to turn his attention to the subject in 1854, and it was after numerous experiments he came to the conclusion that Clegg and Grafton were right in the main. After describing their Argand burner, Mr. Sugg stated that he made his first standard burner for common gas on the same principle, with 15 holes, substituting, however, a steatite top for the ordinary iron or brass top then in use, and that burner has been extensively accepted as the standard burner for gas-testing. The Letheby standard burner is similar to it, with the exception of the size of the central aperture. Mr. Sugg controverted the generally received opinion that the body of the burner should be long between the stem and the jets, so that the gas may be heated as it passes to be burned. He is now of opinion that the gas should arrive at the point of combustion at the temperature of about 58° Fahr., if possible. He agreed with other experimenters that the highest illuminating power is obtained when the gas is consumed at the lowest possible pressure, even as low as 1-100th part of an inch of water, and further, that it is important that the flow of gas to the point of ignition should be easy and uniform; consequently, that the surfaces of the apertures should be smooth. A combination of those principles with the principles laid down by Clegg and Grafton had resulted in the production of the "London "burner," which was represented. In describing that burner, Mr. Sugg said: "It will be observed that the communication "between the chamber containing the holes and the stem is "made by means of three small tubes, and in order to ensure "the issue of the gas at an imperceptible pressure, the sum of "the area of the holes for the egress of the gas at the point of "ignition is much greater than that of the area of the three tubes "which conduct it to the chamber. The chamber is made of "steatite, which is a non-conductor of heat, so that the lower "part of the chamber, which is made of an alloy of tin, is "always kept cool. The contrary would be the case if this "chamber were made of brass or iron, for in about ten "minutes or a quarter of an hour the soft metal would be "melted, and this the writer considers a sufficient proof of "the unsuitability of iron or brass for gas-burners. It is the "opinion of the writer that increasing the volume of gas by "heat is equivalent to diluting it, because the amount of "carbon vapour is spread over a larger area, and that is most "pernicious to gases of low, but less so to those of high "illuminating power."

Mr. Sugg then proceeded to point out the differences in illuminating effects of various kinds of Argand burners as now manufactured, and he showed, by a table exhibiting the results of many experiments, that, with the same gas, as tested by the 14-candle Letheby standard burner, the difference between the highest and the lowest amount of illuminating power was 13 candles. He then refuted the popular error that the higher the chimney the better the light, and it was shown, as the result of experiments, that the effect on a 24-hole burner was about one candle less light for every inch of increased length of chimney.

Fishtail burners next came under consideration, and were most strongly condemned, as giving less light than any other form of burner, though most generally used. After explaining the construction of those burners, he observed that if the angles of the two holes through which the currents of gas strike against each other be acute, the illuminating power is greater, but the burner will stand less pressure without roaring; and "the desideratum would seem to be, to make a fishtail "with large enough holes, and inclining at a proper angle "towards each other, so as to give the best light, and stand "the varying pressures of the street-main without roaring; "and for this purpose various kinds of moderators, regulators, "economizers, perfecters, and other things too numerous to "name, have been brought before the public." Some of these economizers were explained, and diagrams of them were shown, but, even with all these improvements of the common fishtail burner, the experimental results presented a great diminution of light, and Mr. Sugg expressed the opinion that those results were sufficient to prove that, for common gas at least, the fishtail burner is "a costly mistake." In some of the experiments with fishtail burners there was a loss of light of not less than 71 per cent., and the loss with the best of them amounted to 21 per cent. When speaking of a very common application of these burners, Mr. Sugg observed: "Another "error is constantly committed with the fishtail burner, which "is this—that when they are used with glasses, or 'moons' "as they are technically termed, the holes in the bottom of "these moons are narrower than the width of the flame, con-"sequently the sharp current of air induced by the burning "gas folds the sides of the flame together, which is likely to "produce smoke, and certainly makes the flame unsteady."

Another error mentioned is the placing of the cocks immediately under the flame, so that the gas cannot diffuse itself before it reaches the burner, and thus a current of gas of high

pressure is often projected up the orifices, and decreases the illuminating power, as well as produces unsteadiness in the flame.

The bat's-wing burner Mr. Sugg considered to be far superior, for general use, to the fishtail. Its value as an illuminator was shown in a separate table, in which the bat's-wing burner with a steatite top presented the comparatively small loss of 7·14 per cent. on the illuminating power. In the conclusion of the paper, Mr. Sugg adverted to the advantage which an Argand burner possesses of throwing an equal light all round, while with flat burners the light from the edge of the flame is not so great as from the side, which difference was stated to vary from 15 to 25 per cent. The general conclusion arrived at in the paper was, "that, properly fitted, the Argand burner "will be found to be, considering all points, the very best "and cheapest for the general consumer, notwithstanding that "the first cost is much greater than that of the fishtail and "bat's-wing, and that for all other purposes to which the "Argand is not admissible the bat's-wing is the most "suitable."

Circular to Gas Companies.

The Imperial Gas Company's Bill has passed through its second ordeal in the reinforced committee of the House of Commons, without having undergone any change in the most material points—the illuminating power and price of gas, and the preservation of the reserved and contingency funds. Mr. S. Hughes and Mr. G. W. Stevenson were the witnesses called to prove that the illuminating power ought to be raised to 16 candles; but the former had declared, in 1860, that 12-candle gas was quite sufficient, and he assigned no other reason for his change of opinion than that a higher standard had been subsequently adopted in most gas Acts; while the calculations and experiments adduced by Mr. Stevenson to prove that 14-candle gas might be raised to 16 candles, at a cost of a half-penny per candle per 1000 feet, were so directly opposed to the actual facts adduced by Mr. Barlow, that they failed to make any impression on the committee. Mr. Barlow showed, by reference to the accounts of the Dublin Gas Company, that the effect of raising the illuminating power to 16 candles in that city had been to reduce the dividends of the company from 9 to 7 per cent. That substantial fact was more than sufficient to counterbalance, in the minds of the committee, the speculative evidence of Mr. Stevenson, and to determine them to retain the standard of illuminating power at 14 candles. This decision breaks through the hard-and-fast line, recommended by Mr. Cardwell's committee, of establishing 16-candle gas as the standard of illuminating power in the metropolis, and it will make a difference in the profits of the Imperial Company of upwards of £40,000 a year. The committee also decided to leave the price at 3s. 9d. per 1000 feet, as previously fixed; the alteration in the price and illuminating power being, however, to take effect from the 1st of January, 1870, instead of 1871. Clauses were introduced in the Bill, similar to those of the City of London Gas Act, for the periodical revision of the price and illuminating power by commissioners to be appointed for that purpose. Other provisions of that Act, with respect to the appointment of gas referees, gas examiners, and a public auditor, were also adopted by the committee; the appointment of the gas examiners being withdrawn from the parochial authorities, and vested in the Metropolitan Board of Works. The Bill, thus amended, will be reported to the House of Commons when they reassemble after the recess, and will probably excite some discussion.

The Glasgow Corporation have succeeded in obtaining the unanimous sanction of the committee of the House of Commons to the passing of the Bill empowering them to purchase the undertakings of the two Glasgow gas companies, notwithstanding the determined opposition of the latter, who struggled hard to obtain better terms than those offered. The proceedings of the committee on the purchase Bill occupied four days before the adjournment of the House for the Whitsuntide holidays. The companies endeavoured to retain possession of their reserve-funds and their contingency-funds, and, failing in that, they tried to induce the committee to raise the preferred annuities, on the principal portion of the shares, from 9 per cent. to 9½. The Corporation, however, firmly refused to make any advance, and they were supported by the expressed opinion of the committee, that the offer of 9 per cent. on one class of shares, and of 6¾ per cent. on the other, was not only fair but liberal. It was contended, on the part of the gas companies, that, as they were in a safe and certain condition, earning 10 per cent. on the larger portion of their capital, they had at least a right to expect, in return for their shares, annuities to the amount of 9½ per cent. The committee, however, unanimously decided to support the offer of the Corporation to purchase on the basis of 9 and of 6¾ per cent. annuities, to commence from the date of the transfer; and that the companies should on those terms sell their whole undertakings, including their reserve, contingent, suspense, or accident funds, to the Corporation, the latter taking on themselves all liabilities of the companies up to the date of the transfer. The chairman said that, if the companies were not content with those terms, the committee would be unfavourably disposed to look on the preambles of the Bills promoted by them for an increase of their capitals. That opinion was expressed on the third day of the proceedings, but the gas companies continued to press their case on the consideration of the committee, and on the fourth day the previous resolution was confirmed, with the further expression of opinion that there was strong evidence before the committee that there should be one sole management of gas supply in Glasgow, and that such management should be in the Corporation, subject to the regulations that it might be necessary to introduce into the Bill for the protection of the public. Its further consideration in committee was then adjourned to the 1st of June, without any arrangement having been concluded; but on the same day a minute of agreement was signed, on behalf of the gas companies and of the Town Council, for a final settlement of the transfer of the gas-works on the terms offered by the Corporation, subject to the approval of Parliament and of the shareholders of the companies. The conditions of the agreement are to the effect that the undertaking of each gas company, including outstanding debts, reserve, and contingent funds, shall be vested in the Corporation from the 30th of June next; that the Corporation shall relieve the gas companies of their mortgage debts and other liabilities, and shall pay the shareholders annuities at the rate of 9 and 6¾ per cent. on the different classes of shares respectively, payable half-yearly; that the Corporation New Works Bill shall be withdrawn; that the purchase Bill shall be supported by the companies; and that the Bills promoted by the companies shall be withdrawn when the purchase Bill has passed through the committee of the House of Lords, and received the sanction of the shareholders. It is further arranged that the gas companies, in conjunction with the Corporation, shall carry on these undertakings after the 30th of June, at the risk of the Corporation, so long as may be agreed on with the directors. This agreement, which was signed after the adjournment of the committee, it is to be hoped will meet with no obstruction from the shareholders of the company, and that it will prove a satisfactory settlement of this much-vexed question. It may be well to notice that the Bill of the Corporation, for the erection of new gas-works in Glasgow, found no favour with the committee, and was not pressed forward. The feeling of the public in favour of transferring the supply of gas in large towns to the municipal authorities is, as we have previously remarked, becoming so settled that it appears to be chiefly a question of time when the change takes place, and it will be well for all gas companies if they can sell their undertakings on the terms offered by the Glasgow Corporation to the gas companies of that city. The latter really challenged the attention of the Corporation by keeping up the price of gas, to enable them to write off, illegally, large sums from the original cost of their works in the shape of depreciation. The Glasgow Company admitted that they had thus written off £129,743 for depreciation on works and meters, the original cost of which was £488,430. They had also set aside and invested a reserve-fund of £29,104 on a total share capital of £215,000, which sum is considerably in excess of the amount of the reserve-fund prescribed by the Gas-Works Clauses Act, but was specially authorized by their Act passed in 1857.

The Local Board of Torquay are also taking measures to obtain possession of the gas-works of that town. A meeting of the ratepayers was held on the 14th inst., to consider a proposal for purchasing the undertaking of the gas company, and a resolution to that effect was carried.

The affairs of the Cambridge Consumers Gas Company are in process of winding up. The assets to be distributed among the creditors consist of a sum of £5500 paid by the old com-

pany for the land and other property transferred to them, and of whatever further sum may be recovered from the deluded shareholders. The chief creditors are the contractors, and arbitrators are now engaged in adjusting their claims. It is expected that the whole of the assets will be about sufficient for the payment of a dividend of 8s. in the pound on the debts, but the unfortunate shareholders lose the whole of their subscribed capital.

The Aberdare Gas Company have intimated their determination not to sell their works to their threatened rivals, the Aberdare and Aberaman Gas Consumers Company, who succeeded this session in passing their Bill through the House of Lords under the circumstances we have previously noticed. It is the intention of the old company to conduct their works as usual, trusting to being able to obtain statutory powers for that purpose next session. That resolution will test the *bona fides* character of the rival company, and their ability to raise the necessary funds for the construction of new works; and it may also act as a salutary check on speculators who may be waiting to pounce on other unprotected gas companies.

Parliamentary Intelligence.

HOUSE OF LORDS.

MONDAY, MAY 10, 1869.

The GREENOCK WATER Bill was read a second time, and committed.

The DUNDEE WATER Bill was brought from the Commons, and read a first time.

The HARROGATE WATER Bill was returned from the Commons, agreed to, with an amendment.

TUESDAY, MAY 11.

The HUDDERSFIELD WATER Bill was brought from the Commons, and read a first time.

The HARROGATE WATER Bill. The Commons amendment was considered and agreed to.

THURSDAY, MAY 13.

The Royal Assent was given to the WEST MIDDLESEX WATER; LAMBETH WATER; BRYMBO WATER; ILKLEY GAS; and HARROGATE WATER Bills.

The MANCHESTER CORPORATION WATER AND IMPROVEMENT Bill, the CLECKHEATON GAS Bill; and the SPALDING WATER Bill, were brought from the Commons, and read a first time.

The WEST HAM GAS Bill was returned from the Commons, with the amendments agreed to.

HOUSE OF COMMONS.

MONDAY, MAY 10, 1869.

The HUDDERSFIELD WATER Bill, and the ILKLEY GAS Bill, were read a third time, and passed.

The CLECKHEATON GAS Bill, and the SPALDING WATER Bill, as amended, were considered.

The DORKING WATER Bill was read a first time.

The BRADFORD WATER Bill was reported.

A petition against the WATER SUPPLY Bill was presented from the South Staffordshire Water-Works Company.

TUESDAY, MAY 11.

The BARNSTAPLE GAS, and MANCHESTER CORPORATION WATER-WORKS AND IMPROVEMENT Bills, were read a third time, and passed.

The OSWALDTHWISTLE LOCAL BOARD Bill, as amended, was considered.

A petition was presented against the WATER SUPPLY Bill, from Leeds.

WEDNESDAY, MAY 12.

The CONSETT WATER Bill was read a second time.

THURSDAY, MAY 13.

The WEST HAM GAS Bill.—The Lords amendments were agreed to.

The CLECKHEATON GAS Bill, and the SPALDING WATER Bill, were read a third time, and passed.

The ACCRINGTON GAS AND WATER Bill, as amended, was considered.

The CLEVELAND WATER, and the EDINBURGH AND DISTRICT WATER Bills, as amended, were considered, and amendments made.

The IMPERIAL GAS Bill, and the SOUTH METROPOLITAN GAS Bill, were reported.

HOUSE OF COMMONS.

(*Before the Right Hon.* T. E. HEADLAM, *Chairman; Col.* DYOTT, *Mr.* W. JOHNSTON, *and Mr.* RYLANDS.)

NOTTINGHAM WATER BILL.

(*Continued from page* 367.)

THURSDAY, APRIL 15.

Mr. *Hawksley* was recalled, and produced a plan showing the area applied for and the existing area. In reply to questions from the committee, he said the gas company had nothing at all to do with the water-works, although he was engineer for the two, and had been so for many years.

H. Letheby, Esq., examined by Mr. CLERK.

I am professor of chemistry in the college of the London Hospital, and also medical officer of health for the City of London. For many years my attention has been directed to the question of supplying towns and districts with water. I am well acquainted with the present water supply of Nottingham, and have examined the quality on several occasions. I have taken samples of the water now supplied from the Basford well, the Park well, the Scottholme springs, the river Trent, and the Trent reservoir. The Basford well contained 16·19 grains of solid matter in the gallon; hardness before boiling, 10°; after boiling for a quarter of an hour, 6·8°.

By the COMMITTEE: We ascertained how much soap is required before we can obtain a lather in the water. That represents a greater proportion of carbonate of lime in the water; and when I say 10° of hardness, I mean it represents 10 grains of carbonate of lime in the water, or the equivalent to that in the gallon of water.

Examination resumed: It is a difficult thing to say on what basis nitric acid is in combination in Basford. It amounts to 6-10ths of a grain per gallon; multiplied by 6 would be about the quantity of nitrate of lime. In the case of well water the nitrates generally represent the oxygen of sewage or other matters passing through the soil. At the Park works the solid matter is nearly twice as much as at Basford—31·57 grains. I separated the solid matter there and its different constituents, and put them down as ordinary sulphates and chloride of sodium. The hardness was double Basford—20·8°; after boiling a quarter of an hour, 11·4°. It is a deeper well, and no doubt embodies a double proportion of saline matter from the strata through which the water passes. In the Scottholme water the solid matter amounted to 28·33 grains per gallon, of which nearly 5 grains were chloride of sodium, and about 8-10ths of a grain of nitrate. The hardness is much the same as at the Park works.

By the COMMITTEE: Water where there is no hardness is best for certain purposes, but not all. In a large town supply, where the sparkling and clear character of the water is a great consideration, it is better to have saline matter in the water; but for manufacturing purposes soft water is the best.

Examination resumed: I look upon 10° of hardness as a very safe proportion of calcareous matter in all water, and suitable for all purposes; above that it will be too hard. In the Trent reservoir the water contained nearly 50 grains of solid matter—of which about 20 grains were common salt—and nearly 15 grains ordinary sulphate. The hardness was 31·6° before boiling, and 12·9° after. The Bullwell Spring is very good water; 12·19 grains is the proportion of saline matter in it. There are 8·16° of hardness before, and 5·1° after boiling. There is rather more than half a grain of nitrate. In Dover Beck the proportion of salt is 10·63 grains per gallon; the hardness is 5·6° before boiling, and 4° after. Common salts and nitrate are in small proportions. In fact, it is in this respect a very pure water. The Grimes Moor water contains 13·23 grains solid matter; the hardness is 8·8° before boiling, and 4·6° after. That indicates a good water. The two latter waters are both really good for domestic purposes; and for manufacturing purposes they are good waters too. I examined the source of the Dover Beck. I saw it coming at once from the springs at the beginning of the stream. I also examined the Bullwell Spring, the Waterfield Gate Spring, and the river Lene; the waters from those sources contain from 13 to 19 grains of solid matters per gallon—about four times as much nitrates as the Dover Beck. The water of the Lene was very much polluted with the refuse from the different mills. The Castle works water is pervaded with chloride of lime. Looking at the position of the Scottholme Springs, I think it very probable that they would be affected by the impurities that were observed in the river Lene. Taking all the sources at the present time, I look upon the Basford works as the only ones furnishing good water. As a medical officer, I approve of the source selected for the supply of Nottingham. I also examined the water obtained from the public wells and pumps in Nottingham; they contain a very large proportion of solid matter—one nearly 140 grains, and another 124 grains. All of them contain a very large quantity of salts, and also of nitrates and earthy sulphates. I exclude the Wilford bore-hole, which seems to be tolerably good; but all the others are unfit for domestic use. I examined the sewage that comes from Lenton. It runs into the Trent about three-quarters of a mile before you come to Nottingham—just before the company take their water. There is also a bathing-station a few hundred feet above the pumping-works. These two circumstances make the Trent a very unfit place to take the water from.

By the COMMITTEE: The degree of hardness of the Trent water is 18·7; and a great deal of it is from 8° to 10° of permanent hardness. As regards the ordinary sandstone, the deeper the well the greater the impurity; and, under those circumstances, the water becomes more impure the deeper you go into the red sandstone, because the more common salt you get. The experience of the wells at Nottingham shows me distinctly that you cannot go beyond the hole of Basford, which is about 112 feet deep. The hardness rises in proportion to the earthy sulphates dissolved in the water.

Cross-examined by Mr. BIDDER: I adhere to the opinion I have before expressed, that if river water is mixed with sewage in the proportion of 1-20th of sewage, in the run of seven or eight miles, it is good water still. In the Dover Beck and Grimes Moor Little Dyke waters 0·002 of a grain of ammonia is all that is to be found in a gallon. There cannot be any sewage contamination along that beck, so far as my experience goes. You cannot get a water running upon the surface of the ground without organic matter.

Mr. BIDDER: That is organic matter that has not been changed by oxidation, in contradistinction to the sewage which has had a long flow?

Witness: It represents the organic and other matters capable of being oxidized, but I do not admit it is in contradistinction to sewage. The quantity in the Dover Beck is, in round numbers, 50 times that in the Basford works, and the Grimes Moor nearly 67 times as much; yet, being of a vegetable nature, if it were ten times that proportion it would be harmless. We have ascertained by distillation that it is not animal matter. The Park works water contains more nitrates, which have no doubt been derived—as I make out in all well nitrates—from the oxygen of such animal matter as percolates the soil, such as sewage, and so on; but the sewage being oxidized there, it is harmless. The principal defect is hardness, and the quantity of sulphate of lime, which is a bad thing in water. The principal defect in the Scottholme works is the liability to pollution, the springs being so near the river Lene, which is a very foul stream to that point. I have examined those springs on three occasions, and there have been more than 2 grains of solid matter in those springs. It was not absolutely unfit to drink, but there was an indication of the probability of its being unfit at any moment. If nitrate of soda is put on the land, and gets into the water, it would not be a matter of importance.

Mr. BIDDER: Supposing they adopt at Nottingham some of those arrangements by which the night-soil of the town shall be used on the land, do you think the drainage would improve the supply?

Witness: Not if the sewage matter got into the water and was drunk immediately; but the question is whether it is likely to be so.

Re-examined by Mr. CLERK: The soil adjoining the place where it is proposed to take the water is light and gravelly. Supposing that land to be manured, if it is put to me that the sewage is going to run into the stream, it would be an injurious thing; but taking things in the ordinary way, and the chances that it will not be manured—for it is not a highly cultivated neighbourhood—I do not see any difficulty of that kind. The greater part is pasture land. The Dover Beck runs in quite a different valley from

Nottingham. There are two different drainage valleys between—the Lene and the Erewash.

By the COMMITTEE: Assuming the Dover Beck district to become highly cultivated, in my opinion, under the ordinary circumstances of the case, there will be no possible detriment to the water taken. So far as my experience goes, the water that may come from a district of this description—which is exceedingly sandy and porous—whatever cultivation there may be, would not be seriously liable to be affected. It would have to percolate through a quantity of sand, which would have the effect of retaining oxidized injurious matters.

Mr. *J. White*, examined by Mr. CLERK.

I have been connected with different public medical institutions of the town of Nottingham for 25 years. I am well acquainted with the locality in which the Trent Water-Works are situated, and am under the firm conviction that they are extremely liable to contamination from the impurities of the river Trent, and from districts contiguous to those works, which are thickly populated. A large population has sprung up between Nottingham and the river, where these works are situated, within a comparatively few years. That district, I believe, until recently, has been very much without drainage. Supposing there were cholera or typhoid fever in Nottingham, I apprehend the use of that water would be likely to increase the spread of it. I believe the supply from the proposed source will be abundant, and as free from contamination as it is possible for any water to be. I signed a memorial to be presented to the corporation of Nottingham, upon the subject of getting rid of some of the bad water. At the time I saw that memorial, it was signed by the greater part of the medical men in Nottingham. The locality of the Lenton sewer has been very subject to fever—probably arising from the presence of that sewer discharging into the river.

Cross-examined by Mr. BIDDER: I am not aware that steps have been taken to prevent that sewer running into the river any longer. If the company took their water direct from the Trent, instead of from the reservoir, it would do away with the impurity arising from the district, but not that arising from the river.

Mr. BIDDER: Would you be surprised to hear that the proposed source has nearly three times as much sewage contamination as the river Trent, which you object to?

Witness: No; because that might arise from innocuous matter, whereas it is almost certain that the other will at times be contaminated with sewage matter. What I should form an opinion upon, as to the danger to the public health arising from the contamination of water, would be whether the recent sewage matter of a district was likely to be poured into that special reservoir or not, or whether the organic matter arose from other causes. From the examination I have made of this source of supply, I can see no reason at all to prevent the exclusion of any surface drainage.

Mr. BIDDER: If Nottingham can be supplied from wells like the Basford well, do you not think that is a much better source than those streams?

Witness: I do not seriously think it would, because you may have in any well sunk in a sandstone rock a large proportion of injurious organic matter. Assuming we could get the whole supply from wells like the Basford well, I should prefer that supply. I should say that Nottingham is among the healthiest towns in the kingdom.

Cross-examined by Mr. HUSKISSON: I think the sewage of Oxton and Calverton should be diverted.

Re-examined by Mr. CLERK: Referring to the organic matter at Basford well, I find that it is very much larger than I thought, and therefore I should not prefer it to the other. I have no knowledge of the capacity of that well for supplying Nottingham with water. I have no knowledge of the quantity of water that would probably be got by boring into the sandstone in the neighbourhood of Nottingham. I was merely alluding to it in a sanitary point of view. There would be no security that the wells would be free from organic matter, which might filter into them. I have not suffered any inconvenience from a deficiency of water; the company have recently been obliged to be very careful. I live in the high part of the town, which is not supplied with Trent water. The Trent water is not sent higher than the old reservoir,

Dr. *C. C. Bramwell*, examined by Mr. CLERK.

I have gone into the question of the presence of lime in the water at Nottingham. I entertain the opinion that the Trent is an improper source of supply. I signed the memorial to the corporation complaining of the Trent water.

By the COMMITTEE: I know the water generally is very hard indeed; it is the source of constant complaints.

Examination resumed: There is a strong objection in the minds of the people of Nottingham to the use of the Trent water for their supply. I have visited the locality from which it is proposed to take the water, and consider it would be a good supply. I cannot see how it is possible for manure used on the land to have any effect in contaminating the water. The furrows were made in a direction away from the river, as though for the purpose of retaining the water upon the land. I know cases where the Trent water is boiled before persons will drink it in the ordinary way as cold water.

Cross-examined by Mr. BIDDER: It is a matter of importance to the health of a town that the supply of water should be economical. We want water as cheap as possible, but not if it is not good. I should prefer the Beck water to the Basford water, although the other might cost much less.

Mr. *C. Allcock*, examined by Mr. CLERK.

I have lived for a good many years at Bullwell, on the east side of the Lene, which is supplied with a water strongly impregnated with lime. There is one drinking fountain in the middle of the village, put up by a private individual, which is very generally used. The water is brought from the west side of the river, by a pipe with a bore of only 1½ inch. Persons come from all distances to fetch the water, which comes from a spring. There is a great scarcity of good water in Bullwell. We are very deficient in sewerage, and I should say the water is in many places affected through that cause; but I could not prove it by analysis.

Mr. BIDDER: Have you any reason for saying so?

Witness: Yes; I have been inspector and sanitary officer.

Examination resumed: I have lost some horses, and the veterinary surgeon said their death arose from the formation of stone caused by the hardness of this water.

Cross-examined by Mr. BIDDER: When I have been round inspecting, I have had complaints from the inhabitants that the matter from the cesspools has got into the wells, and they could not use the water. There are many springs at Bullwell. In the parish the water is good, but not in the village. The spring from which the water is derived for the fountain is only 300 yards from the village.

By the COMMITTEE: The springs are on the west side of the river.

Cross-examination resumed: If we had a 3-inch pipe we could get more water.

Mr. *W. Maltby*, examined by Mr. CLERK.

I am a surgeon, residing at Old Basford. I confirm Mr. Allcock's evidence with regard to the water at present supplied to Bullwell being a very hard water. Basford is divided into two districts—Old Basford and New Basford. The whole of Basford is within the limits of supply of the water company under their Act of 1845. New Basford is at present so supplied, but Old Basford has never been, and representations have been made to the company on the subject. The people complained of the badness of their own supply of water. In 1865 a public meeting was held, of which I was the chairman, at which a resolution was passed that an application should be made to the Nottingham Water Company to get a supply for Old Basford. A petition unanimously signed by people in Basford was also presented to them. The directors replied that they agreed in the necessities of the place, but were unable to comply with the request in consequence of being barely able to supply the district they were already supplying. They gave every assurance that they would supply Old Basford as soon as they had sufficient water under their control. We are at present supplied from wells, some of which are situated near to privies and cesspools. I think the population in Old Basford is about 7000. Many of the wells are in such a condition that the owners have to go to other sources to get water to use for drinking purposes, and several of the wells are not used at all. They fetch the water from the spring on the other side of the Lene, which Mr. Allcock has mentioned. About 400 or 500 go there every day. I am one of that number. I have plenty of water, but it is not good—it is too hard.

Cross-examined by Mr. BIDDER: There are some springs at Bullwell and Basford, which have attracted bleaching-works from the quality of the water.

Re-examined by Mr. CLERK: The springs referred to belong to the owners of the bleaching-works, and people are daily trespassing to fetch the water. There is no public spring.

Mr. *R. Birkin*, examined by Mr. CLERK.

I reside at Apsley Hall, in the county of Nottingham. I am an alderman, and have been mayor. The town and suburbs of Nottingham have been increasing very rapidly for some years past. In my opinion, the town is in great need of a pure supply of water. I should not use the Trent at all. The general opinion is that that water is polluted with sewage. I know the parish of Basford very well; in some parts of it the population has considerably more than doubled during the last 20 years. Old Basford is very inefficiently supplied with water, both in quality and quantity. I do not know anything of the Dover Beck. I should be very sorry to see the supply of water in any other hands than those of the company.

Cross-examined by Mr. BIDDER: I have no other interest in this matter than as a townsman. One of my sons is chairman of the water company. I was probably a shareholder 20 years ago. My only interest is in having a cheap and good supply of water, and in having the rates reduced.

Mr. BIDDER: Supposing the effect of the works in the present bill, as it is now proposed to carry them out, is to double the dividend required to be raised, how do you think that will affect the cheapness of the water?

Witness: I do not suppose anything of the sort will be the case. The company will regulate that. They will supply a much larger area than they do at present. I know that by the bill the new capital is to be £150,000, but they take power to call that up only as required for works from time to time.

Mr. BIDDER: The first thing they propose to do is to raise £114, according to Mr. Hawksley's account?

Witness: They take that power; but I take it for granted by the time that is done they would have increased their customers so largely that they would be able to do it well. They might also increase their works, and give a larger supply of water by diminishing their labour. If they could get a supply like the Basford works for less than half the money this scheme is to cost, I should prefer it; but I know they cannot, for they have drained some of the wells already which were in existence at the top of the town.

Re-examined by Mr. CLERK: My son is only chairman for the year; that is the regulation of the company. I have no ground to complain of the rates charged for water in Nottingham, as far as I have to do with them; but I do not use much of the water. I never heard any proposal mooted to raise the water-rates in Nottingham. They had a maximum in their last bill, and they have not exceeded it.

Mr. BIDDER: There is a maximum for domestic supply which they are not up to, and they can raise it to their maximum; and as regards their trade supply, there is no maximum at all—they may raise it to anything they like?

Witness: Yes; that is so.

Mr. CLERK: It has been put to you, as a thing very improbable, that by the extension of the area of supply there would be any increased profit. Do you know the same thing was said by the corporation with regard to the gas-works?

Witness: Just the same; but it has enabled the gas company to supply gas to the town 3d. or 6d. per 1000 feet cheaper than they did before. My conviction is that the same result would follow from the supply of water.

Mr. *G. Leigh*, examined by Mr. CLERK.

I am a member of the College of Surgeons, and have resided at Arnold for upwards of 14 years. Arnold is to the north of Nottingham, nearly on the line of the proposed conduit from Dover Beck. The supply of water to that parish has been principally by wells and pumps. There has been a great scarcity of water for a long time past, and many of the wells have become dried up, and others have begun to fill with rubbish and filth, which has percolated from the privies in the district. The majority of the inhabitants go from a quarter to half a mile to fetch their water from the springs outside the town. I have a spring in my own grounds, and many persons come there and fetch it. We are much in need of a better supply of water. In consequence of representations made to the local authorities an inquiry was made by an inspector—Mr. Morgan—last August, with regard to the springs and water supply in the parish, and a report made upon the absence of a special supply. I am aware it is proposed to give Arnold in passing a proportionate supply of the water from Dover Beck, which would be a great blessing to the whole of the parish. I do not see any other mode by which we could get so good a supply.

Cross-examined by Mr. BIDDER: We petitioned in favour of the bill under the impression that it is part of the bill to supply us with water. I am not aware that there will be no obligation on the part of the company to supply us with water unless we guarantee 10 per cent. upon the local outlay.

Assuming we get water from the company, it will not matter much to us where it comes from. There have been several movements to get up local water-works which it was estimated would have cost £4000; but the Board of Health could not agree. We should much prefer it to be done at the expense of the people of Nottingham.

Re-examined by Mr. CLERK: It will be done at the expense of the water company.

Mr. *F. Williamson*, examined by the Hon. G. SOMERSET.

I am an architect and surveyor, and am agent to the trustees of Sir R. Clifton, of the Wilford estate. The state of Wilford with regard to water is very bad indeed; it is very impure, very hard. The trustees are anxious to have a good supply of water from this company. Part of Wilford is on one side of the Trent and part on the other, and pipes would be laid over one of the bridges. The company have hitherto been unable to supply us with water. Burton Joyce is about five miles north-east of Nottingham. I know the place very well; it contains 130 houses, and a population of about 700. The supply of water is bad—by open wells and pumps. I cannot say it is anxious to be supplied under this bill, but think it ought to be. It has the misfortune of lying upon the river below where the sewage of Nottingham goes into the Trent. Calverton is east of Nottingham, and contains about 600 houses and a population of about 2200, supplied by wells and pumps. They generally complain that their water is stinking after being boiled. Some of the wells are in terrible contiguity to the privies and cess-pools of the place.

Cross-examined by Mr. BIDDER: I can give no opinion as to whether the people of Burton Joyce can pay 10 per cent. upon the cost of the mains, nor whether, if the water-rates of the district are not sufficient, the cost must come out of the rates of the people of Nottingham.

Mr. *J. R. Pearson*, examined by Mr. CLERK.

I reside at Chilwell, near Nottingham, adjoining the parish of Beeston, where the quality of the water is very bad. I am a nurseryman, and know the soil very well. The hills of the Trent valley are clay, and the valley itself a gravel overlying the red sandstone. The waters of the district percolate through the gravel down to the red sandstone. The great majority of the houses are supplied with common privies, and the pits are merely bricked up without any cement, and are liable to leakage. At a part of Beeston nearer the Trent the water gets worse, and near the railway station it is quite undrinkable. In one of the largest mills of the place they have gone to a large expense to have a cooler made to improve the water, because it spoilt the boilers very rapidly.

Cross-examined by Mr. BIDDER: The whole of Beeston is supplied from wells. Mr. Watson, at the mill, has put up a fountain, because he got his water from a deeper source, and considered it purer. The parish has done nothing at all. I do not know that the inhabitants expect that the cost of the water supply should be at the cost of somebody else, and not at their own.

Re-examined by Mr. CLERK: The mains are already laid about half way to Beeston.

By Mr. BIDDER: The sewers at Beeston are so flat that they cannot drain properly; there is no water to flush them with, and therefore the water soaks out of the sewers into the wells.

Mr. *Evelyn Abbott*, examined by the Hon. G. SOMERSET.

I reside at Lowgan, which is two or three miles east of where the company are seeking to place their pumping-station. I have lived in the district and have seen the Dover Beck all my life. The flow in the summer varies the least of any river I ever knew.

By the COMMITTEE: It floods very little above the pumping-station; below it does so a little more. There is not much depth of water till you get below the pumping-station. It is about 15 feet wide, and from 18 inches to 2 feet deep.

Examination resumed: I have drunk the water many thousands of times, and am very fond of it. There are a great quantity of springs rising about Oxton.

Cross-examined by Mr. BIDDER: The water is very little discoloured after rain. I may have seen it a muddy red half a dozen times, below the pumping-station. The clay discolours it. A great part of the land on both sides of the beck is ploughed.

Cross-examined by Mr. HUSKISSON: I know your property at Epperstone, and also where the pumping-station is proposed to be placed. It would not have been in sight of any owner of a house upon the stream between your estate and the next paper-mill.

Mr. *R. Richardson*, examined by Mr. CLERK.

I reside at the Cliff Mills, at Lowgan, which is one of the mills worked by the Dover Beck. I am also one of the proprietors of the Epperstone paper-mills, and, in addition, use the water power at another mill on the stream. I have always found the Dover Beck permanent in the summer. It has never been so reduced as to cause a stoppage in the mills. The water is very good above the proposed pumping-station—more so than when it comes to my place. My observation leads me to suppose that the soil of the district would rather tend to improve the quality of the water. It is a sandy soil, and the water, being surface water originally, would, in percolating through the sand, carry less innocuous matter with it. I gauged the water some time ago, with a view of making a dam. To hold 24 hours water, from Saturday night to Monday morning, I found would take 8 acres of area 3 feet deep. There are two large springs upon my premises. I tested them the other day, and found them about 9 inches wide and 2 inches deep. Speaking personally, I shall be put to some inconvenience by this scheme.

Cross-examined by Mr. RODWELL: My notion was that I was sufficiently protected by the law of the country, and also that any argument I could advance against the bill would not be equal to the advisability of supplying a town like Nottingham with water. My idea is that any manure placed upon the surface of the soil would not be carried down by the water falling upon that soil beyond reach of the roots of the plants. Supposing it is a fallow field, the soil absorbs the manure.

Mr. RODWELL: Supposing we have an 18-inch drain, and the water finds its way into that, and the surface of the earth was covered with Nottingham night-soil, do you think that the water that runs through that drain would be pure or impure?

Witness: It depends on the amount of soil. I contend that the quantity of manure applied to the surface would not be diluted and carried down to that depth. I never knew the fact of country people being prevented from using water from a land spring in consequence of the manure. I have seen water in a ditch discoloured when manure has been heaped in a field, but never in a drain.

Cross-examined by Mr. DIGBY: We send a good deal of refuse at times from our paper-mill at Epperstone, which would pollute the stream to some extent, but the pollution disappears to the eye before it reaches my place. I am afraid, when the water of the Dover Beck is abstracted by the intended pumping-station, we shall have no water to carry that refuse down the stream, and our mill will be destroyed. Whatever filth there is in the villages about Oxton, Epperstone, &c., flows into the Dover Beck about the proposed pumping-station. The adjoining lands are a good deal benefited by irrigation in dry seasons from the Dover Beck.

Re-examined by Mr. CLERK: There is no oxide of iron, nor any iron-stone, in the district where this water is proposed to be taken.

FRIDAY, APRIL 16.

Mr. *Matthew Loam*, examined by the Hon. GRANVILLE SOMERSET.

I have been for eighteen years resident assistant to Mr. Hawksley, the engineer of the Nottingham Water-Works. Previously I was resident engineer of the Stockport Water-Works. These are situated over the new red sandstone. I am well acquainted with the stations and sources of the Nottingham water supply. No water has been taken from the Trent for that purpose for many years. I agree with Mr. Hawksley that as soon as we possibly can we should abandon the Trent reservoir. Owing to building operations in progress in reference to a new bridge, the river will be lowered from 18 inches to 2 feet, and consequently our reservoirs will be completely empty. I know all the wells in Nottingham. Although popular, they are not fit for drinking purposes. The Basford well water is good, and I agree with Mr. Hawksley that about 2 million gallons of supply, but not more, may be obtained from this source. The water will gradually increase in hardness by constant pumping. I agree with Mr. Hawksley that a supply of 9 million gallons will be required. I have considered the wells, springs, and sandstone in the neighbourhood of Nottingham, and think that no supply can be relied on in the neighbourhood. I agree with Professor Ansted and Dr. Letheby that the proper supply should be from Dover Beck. I believe that a little over 6 million gallons may be obtained there as a minimum, and I think that it is the proper place for the supply of Nottingham.

Cross-examined by Mr. BIDDER: I took a sample of water about a mile above the works. The quantity is very small, and has deteriorated during the last twelve months. The sample was taken from the colliery, and another from the bore-hole. The colliery water was very much mineralized. I was a witness before the committee on the question of the Derby water supply. I told the committee last year that the Trent water was very good. I saw and drank it, and still do so. When asked if it was good water, I replied in the affirmative. I also then said that I managed the Nottingham works, and that we got a supply from the Trent River. I also stated that it was good water, that there was plenty of it, and that I had drunk it for seventeen years.

Mr. SOMERSET: I thought the Nottingham Corporation had given up the question of the Trent water; if you have not, I must call more evidence on that point.

By Mr. BIDDER: The Trent water is a palatable drinking water, but is unsuitable for manufacturing purposes.

By the COMMITTEE: It is very hard—destructive for boilers. It contains salt; but I do not object to that for drinking purposes.

By Mr. BIDDER: I have gauged the Dover Beck and the other brook carefully and constantly. The average of the weekly gaugings gives not less than 6 million gallons. The uniform gaugings are on Sundays, when the mills are stopped.

By the COMMITTEE: The gaugings are taken on Sundays because they are then most uniform.

By Mr. BIDDER: Since November we have taken the gaugings every hour both on week days and on Sundays, but preferably on Sundays.

By the COMMITTEE: We took the gaugings every hour on week days for many months. They corroborate the Sunday gaugings, on which we chiefly rely.

Mr. CLERK: These, being the only ones that are uniform, are the only ones worked out.

Mr. BIDDER pressed the witness in respect to discrepancies between his evidence and that of Mr. Hawksley, who had stated that the gaugings had only been taken on Saturday night and Sunday; but he replied that both statements were perfectly true.

By the COMMITTEE: We have had two persons, who took observations every hour since November, with the exception of one or two occasions when the river was flooded.

By Mr. CLERK: The returns given to Mr. Hawksley were results of uniform gaugings when there was an equal supply of water in the river. The gaugings at other times were not given to Mr. Hawksley, because they were not uniform.

By Mr. BIDDER: The week-day gaugings were never uniform, but the minimum indicated 6,300,000 gallons. The lowest state of the springs is in November, and the highest in March. I am acquainted with the water from Willford colliery, at the bore-hole that Dr. Letheby stated to be good water, but the quantity is very small. I had to do with the sinking of the Bullwell shaft. The strata is a very compact sandstone, 167 feet in thickness. I agree with Mr. Hawksley in regard to the site that the company had negotiated for with the Duke of St. Albans. If we could obtain it we should have done better than at Bullwell, but should not have increased our supply by more than from 1 million to 1½ million gallons. Bullwell was the only land we could get, but it is not favourable.

Cross-examined by Mr. HUSKISSON: We have had a permanent gauge across the brook, nearly opposite the pumping-station at Epperstone, and another in the same field across the little Grimes Moor Dyke; these would represent the aggregate quantity of water coming from the pumping-station above your property. Mr. Hawksley stated that after the Dover Beck had been abstracted wholly you would still have one-fourth of the quantity of water. I took temporary gaugings which showed that the quantity of water coming on your property was about 1 million gallons daily, or about one-sixth of the total supply. This I discovered in last April.

Re-examined by Mr. SOMERSET: I gauged all the water except that of a very important spring. Including the spring, Mr. Huskisson will still have one-fourth of the water, and Mr. Hawksley and I agree in this respect. The Wilford water is deficient in quantity and bad in quality.

By Mr. BIDDER: I gauged the water last summer by my rule, and ascertained its velocity many times during four months.

By Mr. SOMERSET: The uniform result of a daily supply of 6 million gallons is derived from gaugings commenced in last November, and there has been a permanent gauge up to Easter Sunday.

By the COMMITTEE: We use a notch gauge. The water runs through it, and we measure from the edge to the surface of the water. The velocity is equal to the square root of the depth.

At the request of Mr. SOMERSET, *witness* handed some photographs to the committee of gaugings taken at Dover Beck and Grimes Moor Brook.

He added that the gauges were down six months, and open to access on the part of any person desirous of observing them.

Dr. William Odling, F.R.S., examined by Mr. CLERK.

I am professor of chemistry at the Royal Institution. I have been employed with Dr. Frankland in analyzing a great number of samples of water for the Royal Commission, and have had much experience in analyses of water for the supply of towns. I made analyses of the Nottingham sources in 1861 and 1862. I have compared my results with those of Dr. Letheby. There is a greater amount of solid residue now in the compared waters than when I made my analyses. In 1861-62 the Basford water contained 14·39 grains. In Dr. Letheby's analysis the amount is 16·19 grains. The Park works have increased in solid matter from 27·10 to 31·57 grains; the Scottholme from 22·24 to 28·33 grains; and the Trent reservoir from 43· to 49·7. The degree of hardness has also increased in regard to the four waters just named, during the last seven years. The amount of common salt also shows an increase. In the Basford water there is very little increase of hardness. I have examined Dr. Letheby's analysis of waters, all of which, with the exception of the Wilford water, are unfit for the supply of Nottingham. If the latter was sufficient in quantity, its quality would not be objectionable. The Dover Beck and Grimes Moor Beck are preferable waters to any other, affording both soft and pure water fit for town supply. I arrive at this conclusion from Dr. Letheby's and my own analyses.

By Mr. BIDDER: I have not made separate analyses now.

By Mr. CLERK: I rely on Dr. Letheby's analysis in respect to the proportion of nitrogen, although I should prefer my own. The amount of nitrogen in the form of nitrates is very insignificant; in the Dover Beck too much so to influence the quality of the water. Nitrates of themselves are innocuous. In some cases you may trace the source of nitrates. The presence of ammonia may indicate that of corrupt animal matter. Nitrates afford no measure of the previous contamination by sewage. Water becomes harder by continuous pumping from wells of a deep source, whilst the surface waters of wells maintain a general uniformity.

Cross-examined by Mr. BIDDER: After a well has been in use some years the water generally becomes harder. I maintain that the Dover Beck and Grimes Moor Beck are good waters for consumption. The most important matter affecting the sanitary quality of water is ammonia. The amount of oxygen and organic matter in water is very important. Basford water, in its chemical character, is superior to the Dover Beck. The Park Road works water is superior to both of them. In such respects the Trent water is equal to any of these in regard to nitrogen, oxygen, and organic matter. The reservoir water has a similar quality, in these respects, to the preceding. The absorbed oxygen is infinitesimally small in all cases.

By the COMMITTEE: I attach no value to that.

By Mr. BIDDER: I have no hesitation in recommending the Wilford waters, if no better could be had. They are four good waters, and are as wholesome as others.

By the COMMITTEE: The great point in a town water supply is to afford wholesome and soft water both for drinking and manufacturing purposes.

Re-examined by Mr. CLERK: Organic matter of vegetable origin is less objectionable than that of animal origin. In the waters named there is nothing appreciably harmful in a chemical or sanitary point of view. There is less than 1½ grain per gallon of common salt in the Dover Beck; 1¼ in the Grimes Moor Beck; in the Park Road works, 4½ grains; and 20 grains in the Trent reservoir. I have no doubt that the Dover Beck and other streams are preferable to any of the wells or springs in use at Nottingham, with the exception of the Basford. The waters of the two streams proposed to be taken for the supply are soft waters, and well fitted for the purpose.

Mr. *Edward Joseph Lowe*, F.R.S., examined by the Hon. G. SOMERSET.

I am a magistrate of the county of Nottingham. I am author of several works on the ferns and conchology of Nottingham. I contribute weather reports to the *Times*. The water of the Dover Beck is exceedingly pure; it feeds the Oxton Bog fern, the *Lastria cristata*, the Erhest, and the bog fern. The latter will only grow in a stream of unvarying level, because its roots feed on the surface of the water. The Dover Beck contains only one mud mollusc, the *Insilis fluviatilis*, an inhabitant of trout streams. The beck abounds in trout, another circumstance proving its purity. I have an observatory at Beeston, near Nottingham, at an elevation of about 148 feet above the sea-level. Dover Beck is still higher.

Cross-examined by Mr. BIDDER: No mud mollusca feeding on plants will grow in the water. There are no ducks living on its surface. The bog fern, only called so because of its being found in Oxton Bog, once grew in a very pure stream at Bullwell, but when the water was lowered six or eight inches it became extinct.

By the COMMITTEE: The fern grows attached to masses of soil, with grass growing on the top and sides. The roots of the fern branch downwards laterally. This fern was found above the Lene.

By Mr. SOMERSET: It disappeared with the stream.

After some discussion with reference to the accuracy of the estimates, by Mr. SOMERSET, Mr. BIDDER, and Mr. CLERK, they were not contested, and the case on behalf of the promoters was closed.

Mr. *John Barber*, examined by Mr. BIDDER.

I am the mayor of Nottingham, and a resident of the town. The Local Government Act was adopted in 1859, and the corporation then became the Local Board of Health. They own a large and increasing amount of property in the town. The present water supply is very abundant, and was so last year, with an extravagant private and public consumption. The water is good for drinking.

By the COMMITTEE: It is reasonable in price.

By Mr. BIDDER: I do not always boil the water before use. The mortality in the last quarter of 1868 was 20 per 1000. Cheap water is desirable. There are maximum rates for private consumers, but for other purposes the company can charge what they choose, and so raise their dividend except in regard to private consumers.

By Mr. CLERK: The company are now charging nearly their maximum rates to private consumers.

By Mr. BIDDER: It is proposed to construct works at a cost of £150,000 net, after deducting what may be realized from the whole works, and also to include a district of 24,000 inhabitants, mostly engaged in agriculture. I do not think these consumers would pay rental to pay the cost of laying the pipes, consequently the present consumers would have to bear the extra cost to make up the company's dividend. The population of the town is increasing, and was particularly rapid during the last two censuses. The first proposed expenditure on new works is £80,000, representing, at 7 per cent., a dividend of £5600 annually. There is no prospect of meeting this extra charge by an increase of consumption; it can only be done out of the rates of the present district. I concur with the committee of the corporation that this expenditure is unnecessary. Abundance of water might be obtained in the neighbourhood suggested by the corporation—sandstone water—at an expense of £10,000, that supply being 4,500,000 gallons daily.

By the COMMITTEE: I object to the issue of new capital at 7 per cent.

By Mr. BIDDER: The question was settled with the gas and water companies some years ago, both of whose shares are sold by auction. We object to any deviation, on the part of the corporation, from the dividend of the gas company at 5½ per cent., and the water company at 5 per cent.

By the COMMITTEE: We want things left as they are. The only object of the new scheme is that the water company may raise their dividend to 7 per cent.

By Mr. BIDDER: There is no difficulty now in selling the shares by auction, as they realize a premium of from 6½ to 7 per cent. We do not think that the new district would pay if charged at the present rates. There ought to be differential rates to meet the cost of outlying districts, the rents of the houses being much lower there than in the town, hence the water rental would be less in proportion. The company ought not to have the power to sell existing works, because those connected with the Trent might be eventually of great use for supplying an abundance of water for flushing and other sanitary purposes. To avoid a parliamentary contest, the corporation had offered to purchase the company. The latter declined entering into any negotiations on the subject.

Mr. BIDDER asked witness to read twelve questions which had been proposed, to obtain information from the company on the part of the corporation.

Mr. CLERK objected that the matters were of a private nature.

Witness was, however, permitted to read the questions, which related—1. To the fixing of a 5 per cent. dividend. 2. To the retention of the auction clause. 3. To a provision to expend the present before raising new capital. 4. To agree to supply by meter at the present district rates, and not to exceed present prices. 5. An inquiry as to what works the company proposed to abandon. 6. What necessity there was for further outlay. 7. How this could be incurred without raising the price of water in the present district. 8. Whether the interest, compensation, &c., to be paid would not be very costly. 9. Why the company did not insert a clause for a differential charge in the new district. 10. How they propose to secure their supply from accidental causes of impurity. 11. Why new wells, larger reservoirs, and an increased supply of water from the Trent had not been proposed. 12. If the preceding matters were not agreed to, would the company sell their works, and on what terms.

By Mr. CLERK: The corporation declined to give any answer and to discuss the questions with a deputation from the corporation.

By Mr. BIDDER: Their refusal was conveyed in a letter dated the 17th of February, 1869. We again offered to settle the matter on liberal terms, but this offer was also declined. This offer was dated the 15th of March. [Letter read conveying the offer of the corporation proposing terms for purchase, &c.] This offer being declined, we offered to purchase the company outright; but this again was declined by them.

By the COMMITTEE: A memorial was presented to the Town Council by many medical men, complaining of the impurity of the present water supply, signed by almost all the doctors, referring to the Trent supply.

By Mr. CLERK: It was an address from 26 medical gentlemen, urging the abandonment of the Trent supply.

By the COMMITTEE: I have no reason to believe that it was endorsed by the inhabitants. We know that the Trent water is not fit to drink, and we do not advocate it.

Cross-examined by Mr. CLERK: I was mayor when this document was presented. It was signed by the principal medical men in Nottingham. It referred to the Trent water, and I knew that the company had a bill before Parliament. We thought that they had given up the use of Trent water. I think that the medical gentlemen objected to the use of Trent water on account of the impurities from sewage and other causes. I objected just now to abandoning the Trent, because of the loss that would be incurred from the sale of adjacent land, and that the water might be of use in cleansing the sewers and flushing the streets. In the petition of the corporation they termed the Trent a "natural source of a cheap and unlimited supply of water," and objected to its being abandoned in favour of the scheme proposed by the company's bill. We expect that, in course of time, the Trent and all English rivers will be purified from sewage. About half of the Lenton sewage reaches Nottingham by the Trent. I would retain the present system of bathing in the Trent. I do not allege that the present water from the Trent source is good. We can only purchase so much of the water-works as applies to the borough of Nottingham. About 140,000 persons are now supplied by the company, of whom about 85,000 belong to the borough. We should have applied to Parliament for power to extend beyond the borough in the event of our purchasing the company. I do not anticipate objections on the part of local boards. I think the present supply sufficient. The whole of Old and New Basford is within the present district of the water company. If the new works were constructed, the company would lay out much money, and have power to make their dividend 7 per cent. by increasing their price for the supply of water. There has been no complaint about the prices charged, but the company have the power to increase them, except in respect to private consumers. The present supply is cheap. Several districts outside of the town require a supply. They are below where the sewage of Nottingham is discharged into the Trent.

By the COMMITTEE: The Registrar-General estimated the population of the borough for the last quarter at 85,000 persons.

By Mr. CLERK: There is much space yet unbuilt on. There has been a large increase outside of the town, and it is going on. The inhabitants require a good supply of water at a moderate cost. The corporation opposed an attempt to enlarge the area of the gas supply, because the company tried to raise their dividend to 7½ per cent., and to allot shares. The company arranged to charge differential rates for the outlying districts, and to limit their dividend to 5½ per cent. I do not think that the water company would get any increase of revenue by this scheme. I would charge the outlying districts a fair price. I do not understand Mr. Hawksley's explanation of the reason why a sale by auction of the shares of the company was fixed on. I believe that the arrangement was first made with the gas and subsequently with the water company.

Re-examined by Mr. BIDDER: If Nottingham had now the cheapest water supply, that is no reason why money should be wasted on the new scheme, as good water can be given without it.

By the COMMITTEE: The negotiations with the company were commenced after the latter had given notice for their bills.

By Mr. CLERK: The negotiations commenced after the corporation had petitioned against the bill.

Mr. *John Lawson Thackeray*, examined by Mr. BIDDER.

I am a magistrate of the borough, and was mayor two years preceding Mr. Barber's mayoralty. I agree with the views he has expressed. I have studied the question of the capital and reserve of the company. [The

witness then entered into various statements showing the financial position of the company, that has already been afforded under Mr. Hawksley's examination.] The unexhausted borrowing powers are £30,550, and not £24,000 as stated by Mr. Hawksley.

A discussion between Mr. Somerset, Mr. Hawksley, Mr. Bidder, and the witness here arose, that left the question of accuracy as to the borrowing powers undetermined.

By Mr. BIDDER: Besides the difference of amount between Mr. Hawksley and myself, there is to be added to the £45,000 of share capital the premium realized on the shares, at the rate of £7 per share on 900 shares. I think there is no necessity to spend a sum of £150,000. Good sandstone water could be abundantly supplied from wells sunk in the district, and at a cost of £20,000, equal in quantity to that obtained at Basford Lane station. I do not think that any increased revenue from the increased population would pay the dividends on the new capital. During eight years, from 1860, the increased receipts of the water company were £3899, and the increased expenditure £3978.

By the COMMITTEE: The result shows that with increase of receipts, the working expenses, interest, &c., showed a net loss of £78. Most of the manufacturers are resorting to wells in place of the company for a supply.

By Mr. BIDDER: There has not been any large increase of trade lately. The new expenditure would indefinitely postpone a reduction of rates. [The witness here explained the arrangement in reference to fixing the water company's dividend at 5 per cent., already noticed in Mr. Barber's evidence.]

Cross-examined by Mr. SOMERSET: I am prepared to contradict Mr. Hawksley when he states that the fixing of the water company's dividend at 5 per cent. was voluntary on their part. I am satisfied I am right. The poor-law guardians are not now largely supplied by meter by the company. They have a well, and raise the water by power. The population is not rapidly increasing now. The increase since the last census we estimate at 10,000 in the borough alone.

By the COMMITTEE: There is no means of ascertaining the actual increase since 1861. You cannot double your rate for private consumption —you could not double the rate to manufacturers, because they would not take the water at that price. I disagree with Mr. Hawksley when he states that, with an increased supply of water, the revenue of the company is increasing. Their expenditure is a little in excess of their (increased) receipts. I estimate these as £500 a year against Mr. Hawksley's £1000.

By Mr. SOMERSET: I repeat that I doubt Mr. Hawksley's statement that the borrowing powers of the company are now £24,000, because in the accounts rendered by them in 1868 it appears to be £30,550. I fully believe that the town can be amply supplied with water from wells in the sandstone for much less than a cost of £150,000. I am not an engineer. I engaged Mr. Hawksley to sink a well for me.

Re-examined by Mr. BIDDER: In 1860 the water rentals were £13,143 9s. 1d., and in 1868 they amounted to £17,743, showing an increase of £3899, or about £500 annually. The increase of the total expenses has been £2768.

By the COMMITTEE: During the whole 30 years I have worked my well the supply has been uniform, and it now stands as high as when first tapped. I prevent injurious effect on my boilers by letting the water into a cooling reservoir, and let all the water from the mill run into this reservoir.

Sir *Robert Clifton*, examined by Mr. RODWELL.

I am Member of Parliament for Nottingham, and live at Clifton Hall, about four miles from the town, and have some valuable colliery property. I have lately opened a pit called Wilford Pit, and have come on a large supply of water. I heard Dr. Letheby's evidence on the analysis of the water. Ten thousand gallons were afforded out of a 2-inch bore-hole in 24 hours. Wherever shafts have been sunk there has been abundance of water, sufficient for the extra supply required for Nottingham. I think these sources would be the cheapest supply for the town. There has been no diminution of the supply; it is continuous. With a large pipe, 3 million gallons per day might be obtained. As far as I can judge, it is an unbounded supply. I am willing to supply the water if desired.

Cross-examined by Mr. CLERK: There are three bore-holes. No. 1 is the farthest from Nottingham; No. 3 the nearest. The water flows out of the top of the bore-hole, and rises to the surface and flows into the river. We are now pumping continuously to keep the water down. Our engine is a 40-horse, beside the smaller engines that will work up to 26-horse power each. The bore-hole is about 226 feet deep, and the shaft is about 40 or 50 yards, at the present time, below the surface of the ground.

Re-examined by Mr. RODWELL: My object is to get rid of this water for my own purposes, and independent of the question of the Nottingham water supply. The facts stated are incidental to the working of the collieries, and as such have come to my knowledge.

Mr. *John Brown*, examined by Mr. RODWELL.

I am a civil and mining engineer. I have heard and confirm his statement as to the abundance of water. I think the supply would amount to 2,800,000 gallons a day. If the water had not been stopped off, we should have had a permanent flow to the extent stated. The stratum consists of 10 yards of gravel and sand, from which about 600 to 700 gallons per minute are afforded. Next follows the sandstone. The pit is about 60 yards from the Trent. The river has risen 10 feet. There has been no diminution of the volume of the water since the wells have been pumped. I believe that a constant supply can be obtained from this source.

Cross-examined by Mr. CLERK: We should have got a regular supply of 2000 gallons per minute if we had desired it. Our object was to get rid of the water. [The witness explained, by reference to plans, the action and withdrawal of the water of different strata.] I am clear that the springs do not follow each other down.

By the COMMITTEE: They are all separate.

By Mr. CLERK: The greatest quantity of water we have ever raised at one time is from 700 to 800 gallons per minute, from the sandstone, at a depth of from 20 to 30 yards from the surface of the ground.

By Mr. CLERK: The shaft is now about 40 yards deep. We get no greater quantity at the bottom than about half way down. I believe fully that a permanent supply of 2000 gallons per minute could be obtained from this source.

Re-examined by Mr. BIDDER: I have had a very long experience in rocks of this stratification, and my opinion agrees with that of Dr. Ansted, that, in this sandstone, the water comes from cracks or fissures. The different springs that we have passed through are distinct from each other, and would, in the aggregate, afford the amount I have mentioned.

MONDAY, APRIL 19.

Mr. SOMERSET proposed to hand in a statement to show that Mr. Hawksley's evidence as to the amount borrowed by the company was correct,

Mr. BIDDER objected, and submitted that a witness should be called to prove the figures.

Mr. *J. R. Brown*, examined by the Hon. G. SOMERSET.

I have been through the books of the company. The total amount of borrowed money at the present moment is £15,480. I am solicitor to the company, and dated the mortgages.

By the COMMITTEE: The rate of interest upon some of the mortgages is 4 per cent., and upon others 4½ per cent. The charge for interest last year, I think, was £672. I do not know at what dates the money was borrowed.

Examination resumed: I did not extract the dates, because I did not know they would be required. I cannot give the amounts borrowed since the accounts were delivered, in 1868, to the clerk of the peace. I only prepared the amount absolutely owing, which is £15,840.

The CHAIRMAN said the books had better be produced.

E. Hull, Esq., examined by Mr. BIDDER.

I am one of the senior officers of the Geological Survey, and a Fellow of the Royal and Geological Societies. I was engaged in the geological survey of the immediate neighbourhood of Nottingham—all the country southward and westward, but not to the north; but recently made an examination of the district to the north with special reference to the question raised before the committee upon this bill. I paid particular attention to the question of the supply of water, and specially from the new red sandstone, as an interesting one involving economical points connected with geology. I was consulted by the London and North-Western Railway Company to find a site in the new red sandstone for the supply of the town and works of Crewe, and the matter was limited to this, that I should find it within the bounds of their property. I selected a site at Whitmore, which has been extremely satisfactory in giving a large supply—as much as they may want for any length of time to come. I was also engaged in the cases of Birmingham, Southport, and St. Helen's, which are all in the new red sandstone.

Mr. BIDDER: Will you give the committee your opinion, after applying your knowledge to the question, as to the situation of Nottingham with reference to the question of water supply?

Witness: Yes. I may premise, perhaps, for the satisfaction of the committee, that the views which I am about to state are not those which have been adopted in reference to this bill; but in a paper which was published of the transactions of the Manchester Philosophical Society, I stated, amongst other towns, that Nottingham was peculiarly favourably situated for the supply of water from the new red sandstone. That paper was published in 1864, but was read in 1861 or 1862.

Mr. BIDDER: Will you, as succinctly as you can, explain to the committee your views with regard to the resources of the district for the purpose of water supply?

Mr. SOMERSET objected to the question, on the ground that this point had not been raised in the petition, and that Mr. Hawksley, the principal witness for the bill, had not been cross-examined upon it.

Mr. BIDDER submitted, in support of the question, that the point had been raised in the petition, and that Mr. Hawksley had been cross-examined upon this point.

Mr. SOMERSET having been heard in reply,

The CHAIRMAN said that the promoters had given evidence as to the general geological character of the district, and that the committee could not shut out evidence to the contrary.

Mr. BIDDER (to the witness): Will you confine yourself to the new red sandstone in the immediate neighbourhood of Nottingham, and tell me what are the resources of that district for water supply?

Witness: I had never any intention of going any great distance from Nottingham. Perhaps I may be allowed, in answering this question, to give a brief account of the geological structure of the district. The general dip of the new red sandstone is towards the south-east, at a very low angle. From below that comes out the boulder sandstone or conglomerate, extending from Nottingham northwards for many miles. The thickness of the water-bearing rock, as shown by one of the sections of the geological survey, is nearly 400 feet. At the base of that occurs a bed of red marl, which is the uppermost stratum of the formation in this district, as was proved in the well which was sunk by Mr. Hawksley. That marl may be considered almost impervious to water, and, consequently, whatever water percolates into the sandstone rock is retained at the base. Below the red marl is the magnesian limestone, which is only thin in that district, and then there are the coal measures. In order to come to some conclusion about the quantity of water which is in this rock, over an area of about 26 square miles, we may take the rainfall at about 26 or 28 inches in round numbers, and in general in other districts in Lancashire and Cheshire. When we endeavour to make calculations as to the quantity of water which percolates into the sandstone rock, we take one-third of the rainfall as the quantity which percolates, allowing two-thirds for evaporation and for surface drainage. In this district the surface drainage is absolutely nothing; the rock is so absorbent, and so close to the surface, that there are no brooks and no ditches over the whole of this district, except those which arise from springs in the new red sandstone itself, such as the Dover Beck. Therefore, the surface drainage is an element which has been eliminated here entirely, and, except the quantity of rain which is evaporated back into the atmosphere, we may say that the whole of the rainfall percolates into this area. Although I should be perfectly justified in taking two-thirds or three-fourths of the rainfall as the quantity which percolates into the rock in this district, yet, taking only one-half, that gives 500,000 gallons per day per square mile, and that multiplied over the area which we have here, gives the total percolation as from 9 million to 9½ million gallons per day. I take the area north of the village of Arnold, so as not to interfere with the existing wells at which the pumping operations are carried on. Then we have to deduct a certain quantity—perhaps 2 million or 3 million gallons—for the springs; and then we have an available quantity, I should say at the very lowest computation, of 7 million gallons. But really I am satisfied in my own mind, for the reason I have stated here, that this is much below the estimate, inasmuch as we have no surface drainage, and the percolation must be so large that we have really an available quantity, within this distance, above what is already being utilized, of something like 11 million or 12 million gallons. Then, in addition to what I have said, I wish to refer you to the geological section of the Government survey.

Mr. SOMERSET objected that this evidence was given not as to the immediate vicinity of Nottingham, but as to any other place.

The CHAIRMAN said he did not see how the evidence could be limited.

Witness: I have here a horizontal section, on a scale of six inches to a mile, drawn across this district, and showing the position of the different strata. The object with which I produce this section is, that it is a natural section of the surface ground. The rainfall which filters into the rock will naturally flow towards the south-east, and, therefore, a large quantity of

water might be expected to come out all along; and it is owing to that that I consider that there is such an enormous quantity of water in the sandstone that is under the town, and immediately around Nottingham. It find its way from this large tract of higher ground towards the south-east.

By the COMMITTEE: The Dover Beck is the only spring over the whole of this district. If the Dover Beck were left alone the springs which now constitute it would flow under the ground and on to Nottingham, where the water would come out if wells were sunk in a proper position to catch it.

Mr. BIDDER: The result of your evidence is that 7 million gallons can be got for 28 or 29 square miles. Mr. Hawksley's evidence is that they usually find by experience that they get 1 million gallons per day from that formation from about every 3 square miles of surface. Applying that rule, the yield of the 28 square miles would have been 9 million gallons a day, so that your view is more moderate than Mr. Hawksley's.

Witness: It comes to about the same. I think that is after I had made the deductions for the springs. The fact is that the district about Nottingham is exceptionably favourable, from the absence of boulder clay, which is so prevalent in Lancashire, and Cheshire, and which prevents a great deal of rain from percolating into the rocks. We know that it percolates there, except what evaporates, because there are no brooks.

Mr. BIDDER: Is your opinion as to the abandant supply from that stratum confirmed by any facts which have come under your notice at Nottingham in respect to the wells?

Witness: Yes; in the first place there are very fine springs at Bullwell—most beautiful water I should think.

The COMMITTEE: But Bullwell was a failure, was it not?

Witness: No; I am speaking of the springs. Then there is the large quantity of water which the Bagthorpe wells are capable of yielding, according to Mr. Hawksley's own estimate, which have been eminently successful because they have been sunk in the right position.

Examination resumed: Then there is Radford well, belonging to one of the factories. The water level in that well was only lowered two or three feet by the sinking of the Park well belonging to the company, which pumps, I believe, about 800,000 gallons a day, and the distance between those two wells s about a quarter of a mile. I may say I believe that, within the limits of the present Act, they might have sunk two wells from which 1½ million gallons per day might be expected. One of the wells, the site of which I selected, is situated near Five Mile House, and another is near Sherwood Lodge. I think you will find there is a very great difference in the estimates for the two works.

Mr. BIDDER: I am not going into questions of detailed expense with you; but apart from that, is there manifestly this advantage in obtaining an additional supply by sinking sandstone wells—that you can do them one by one, as the wants of the town increase?

Witness: Quite so. I think that is a decided advantage in this case. According to the project of the company and of Mr. Hawksley, you have an immediate large outlay absolutely indispensable. In this case you need only sink your wells over the water-bearing district, according as the wants of the population increase and demand an increased supply. I have examined the Bullwell shaft, and have considered the question of the stratification there, and the reasons of that failure.

Mr. BIDDER: In your judgment, is that any indication of what might be expected from shafts properly selected and sunk in the district?

Witness: No; it is only to my mind additional evidence of the extraordinary water-bearing capabilities of the stratum.

Mr. BIDDER: It is in evidence before the committee that the result of that sinking was to give a very insufficient quantity, and also an inferior quality. Will you give your views as to the reasons for that?

Witness: The reason, I think, is perfectly apparent. In order to get a good supply of water from the new red sandstone in that district, you must evidently go in the direction of the dip, because the water flows in that direction. But the trial shaft, at the Bullwell well, was sunk in a position which is only within half a mile of the western margin of the formation in the district, which is naturally drained by the springs which burst out along that margin. I am quite satisfied that Mr. Hawksley would not have selected such a position if he had not been compelled to it from the causes which he stated; but still Mr. Hawksley did state that there were 400,000 gallons per day yielded at that well, notwithstanding the unfavourable position in which it was sunk. I think you will find that there were 400,000 gallons per day pumped at that trial shaft, and really I was surprised that such a large quantity could have been obtained there, considering the position of the well.

Mr. BIDDER: In your judgment, did the passing through into the coal measures affect the experiment?

Witness: Yes; Mr. Hawksley's own statement in that respect was perfectly conclusive that they found salt water in the coal measures, which, of course, mixing with the fresh water, destroyed the water for the purposes of the supply of the town.

Examination continued: I have formed a very decided judgment upon the quality of the sandstone water. I think that for general household purposes, for drinking purposes, brewing, bleaching, and similar purposes, it is a water of the finest quality. It is certainly a little hard, but the hardness varies in different districts; but as a drinking water, and for household purposes, it is infinitely preferable, in my opinion, to the water from the surface drainage, and it has also this very decided advantage, that under no circumstances can the water from the deep wells in the new red sandstone become contaminated with sewage matter, which is an objection open to all brooks which flow through agricultural districts. I have been to the Wilford colliery, and the water which is being tubbed out there is from sandstone of the same formation. The district round that colliery is not within the area I have spoken of; it is on the other side of the town, and is quite distinct from and in addition to my calculations, although it is in the same formation. At the same ratio of increase as at the present time, it will take, I should think, 43 years for the population to double itself.

Cross-examined by Mr. SOMERSET: I do not propose the Radford well as a source of supply for Nottingham. At Liverpool the wells are in the red sandstone. A few of the wells near the river have become polluted, but not the deep wells, so far as I am aware. I cannot tell accurately how many gallons per day the spring at Bullwell produces, but I should think from 800,000 to 1 million gallons. I last saw it in March last, when there had not been rain for two or three days. I am surprised to hear that when it was gauged in March there was found to be only 224,000 gallons. That well was not sunk in the proper place; it ought to have been placed farther east, as Mr. Hawksley would no doubt have done if he had had the opportunity. The quantity of water to be obtained from the sandstone formation depends, amongst other things, upon the proper position of the well with regard to the formation. If you place it near the margin you cannot expect such a supply as if you place it where you have the whole of the formation underneath. I do not know what quantity of water has been taken from the Wilford bore-hole. I only know that when I visited the colliery they had a very large quantity of water to deal with, and they had to stop their sinking operations to put up larger engines. I calculate the quantity of water over this area upon the principle that a certain amount of rain falls and a certain quantity percolates into the rock, and ought to be found in proper positions. A certain rainfall, a certain character and thickness of the rock, a certain area, and a certain dip, must all be taken into consideration.

Mr. SOMERSET: Do you think it would be wiser for us to go and sink somewhere or other, where we do not know whether there is water or not—except, of course, from the opinion of eminent gentlemen like yourself—instead of going to Dover Beck, where we can see the water, and judge of its quantity and quality, and so forth, and also of the probable expenses—is that your view?

Witness: Yes.

Cross-examination resumed: The two sites I have named—Five Mile House and Sherwood Lodge—are within the limits of the company's present Act.

Witness and Mr. Hawksley explained the plans to the committee; the latter stating that the sites mentioned were without the present limits of the company's powers, and that no notices had been given for taking water from the places mentioned.

Mr. BIDDER said the company would be entitled to lay their pipes along the road; they took power to purchase 30 acres of land by agreement, and he was in a position to offer them this very land by agreement if they chose to take it.

In reply the chairman, Mr. SOMERSET said that the district coloured red on the plan before the committee was the only district within which the company might supply water.

Mr. BIDDER submitted that the district included both the district available for water supply and that in which water might be supplied to the inhabitants; and that the reason compulsory powers were taken was because it was proposed to take the lands of private individuals.

The committee deliberated, after which

The CHAIRMAN said the committee were of opinion that the proposal of two places of this description, not within the limits of derivation, was in reality an alternative scheme, and that it was, therefore, unnecessary to go into it.

Cross-examination resumed: One of the advantages of going to places like those I have mentioned would be that we should not have to pay compensation, which is a very material advantage.

Mr. SOMERSET: Is it not rather unfair to the people who are interested in the water? In plain English, should we not be guilty of larceny?

Witness: No, certainly not; if you keep within the limits of the law.

Mr. SOMERSET: We should not be convicted, certainly; but do you really mean to say it is a proper thing that we should go to a district and take away the water from a well, and give no compensation?

Witness: I say that that is the law at present, and that decisions are made in the spirit of that law every day in questions of that kind—that underground waters are the property of the person who sinks for them; and I do not think that any other rule could be properly applied to them.

Mr. SOMERSET: I am not going to argue with you, but I was going to refer the honourable and learned chairman to the 12th section of the Water-Works Clauses Act of 1847—"And shall make full compensation to all parties interested for all damage sustained by them through the exercise of such power." Do you think, morally speaking, that it would be a right or proper thing for a company to do, or for Parliament to admit?

Witness: In answer to that, I may state that yesterday, when a similar question was put to me on the part of the representatives of the London and North-Western Railway Company, which has a little well near the proposed well that is to be sunk for the supply of St. Helens, I gave the very same answer that I have given to you now, that they have no *locus standi* for such a demand, and that they could only be supplied at the ordinary rates. There is no special power over underground water. If a man has a well in one field drawing water, another man has a right to sink another well in the next field on the next property, and get as much water as he can; and that has been constantly done in the manufacturing districts.

Cross-examination continued: I take 26 inches as the gross rainfall for that district. A small quantity comes up afterwards by evaporation; but I should not think more than one-fourth. If I were told that the evaporation is 16 inches I should contradict it. I do not deduct anything for floods, it being one of the peculiarities of this district that the water does not run off the surface.

Re-examined by Mr. BIDDER: A series of very elaborate experiments were made some years ago upon the basin of the Seine. The quantity of rain over the basin was ascertained, the amount of water the Seine poured into the sea, and then the evaporation and percolation; and the results, as near as I can recollect, proved that about one-third was applicable to percolation, one-third to evaporation, and one-third to surface drainage. The precise proportions vary in different districts.

The CHAIRMAN said the committee would accept it as a general rule that one-third should be taken for each of these different things.

Re-examination resumed: In this case I have taken one-half, because there is no surface drainage over this new red sandstone area, and therefore one of the three thirds is eliminated.

E. Frankland, Esq, F.R.S., F.B.S., examined by Mr. BIDDER.

I am a corresponding member of the Imperial Institute of France, and professor of chemistry in the Royal School of Mines. Since 1865 I have reported monthly to the Registrar-General on the chemical qualities of the waters supplied to the metropolis for domestic purposes. I have analyzed a specimen of water taken from the Dover Beck. The water was turbid from a considerable quantity of suspended matter. Before the analysis it was filtered, so that my analysis refers to the filtered water, and not to the water in its natural condition. The matter in suspension was chiefly of a vegetable character, but I did not examine that very minutely. The filtered part contained or gave the following results on analysis:—Total solid impurity in grains per gallon, 9·97. The organic matter found in this water contained 1·69 grain of carbon, and ·001 of nitrogen. The water also contained ·004 grain of ammonia, and ·323 grain of nitrogen in the shape of nitrates and nitrites. The total combined nitrogen, as distinguished from the atmospheric nitrogen dissolved in the water, was ·338 grain. The nitrogen in the form of ammonia and in the form of nitrates and nitrites indicates that the water had been in contact with manure or animal matter of some kind, equal in quantity to that which is contained in 3038 parts of London sewage. The chlorine contained in the water, in the condition of common salt, amounted to ·91. The total hardness of the water was 6·42°; the temporary hardness—that is, the hardness lost on boiling—3·09°; and the permanent hardness remaining, after boil-

ing for half an hour, was 3·33°. The analysis gives evidence of the water having been previously in contact with solid manure, as distinguished from liquid manure or sewage. If it had been contaminated so as to yield this quantity of nitrates by liquid manure or sewage, the proportion of chlorine would have been much larger than that which is contained in the water. I have seen Dr. Letheby's results as regards the Basford well water.

Mr. BIDDER: Will you give the committee your opinion of the relative merits of the water represented by the analysis of Dr. Letheby, specified as being from the Basford Water-Works, and the Dover Beck water which you have analyzed?

Witness: There are no data in this analysis to show absolutely the quantity of organic matter, or the quantity of organic carbon, or nitrogen, in this water; but still there is one determination here which indicates, as far as it goes, that the quantity of organic matter in the Basford water is very small indeed. The quantity of previous sewage or manure contamination, according to this analysis, should be considerably larger than that in the Dover Beck, but if we take into consideration that this Basford water, I believe, filters through a considerable thickness of sandstone, that previous contamination with animal matter becomes of comparatively very little importance. It is when this contamination occurs in river water, where there is scarcely any previous filtration, and where the filtration to which a water company can subject it must of necessity be very much slighter than that which is naturally effected in the sandstone rock, that this kind of contamination is of much more importance. I, therefore, think that the Basford works water is greatly to be preferred, for the supply of a town, to the Dover Beck water, as regards probable salubrity. I do not think that either of the waters is exactly a proper water to supply to a town, neither the Basford nor the Dover Beck.

By the COMMITTEE: They are too hard, or at least the Dover Beck is not too hard; that is a tolerably soft water, though by no means a very soft water. The Basford water is rather too hard for supply to a community.

The COMMITTEE: But subtracting from the Dover Beck the impurities which you seem to think come from contact with animal matter, does the water seem to be of the same kind in the Dover Beck as in the Basford well?

Witness: No; it is very much more contaminated with undecomposed organic matter than the Basford water, and that we almost invariably find to be the case in comparing river water with deep well or deep spring water. Percolation through a great thickness of rock, or even of soil, has a very much more powerful oxidizing influence on the organic matter than flow in a river.

The COMMITTEE: Would you infer that the Dover Beck had not come from any depth under the ground, but that a considerable portion of it had been gathered up from the surface?

Witness: I should think so. At all events, if any of it has come from a considerable depth, it must have become mixed with other water which has come from the surface.

Mr. BIDDER: Then I understand, as between the two waters, if the additional supply of Nottingham can be drawn from either source, as between the Basford water and the Dover Beck water, you would prefer the Basford?

Witness: I should prefer the Basford.

Cross-examined by Mr. SOMERSET: The samples were taken by gentlemen in the country, and analyzed by me in London. I received them about the 20th of March, but when they were collected I do not know. The turbidity was removed by filtration. In reference to Dover Beck, there is no essential difference, I think, between my analysis and that of Dr. Letheby. Some of my determinations are over and above those made by Dr. Letheby.

Mr. SOMERSET: Dr. Letheby and you seem to agree pretty nearly upon that. As to previous sewage contamination, let me see if I can put that accurately. That is contamination that does not exist, is it not?

Witness: It is. It is contamination which has previously existed, but which has been removed by oxidation so far as chemical analysis can show its removal.

Mr. SOMERSET: It might have existed, according to your theory—do not suppose that I treat it with disrespect—a million years ago?

Witness: Oh, no! certainly not. I ought, perhaps, to have stated, in the first place, that chemistry is quite powerless to distinguish between wholesome water and unwholesome water.

Mr. SOMERSET: I will not go into that, if you please, at present.

Witness: That has a very distinct bearing upon this question of sewage contamination. I am afraid that I cannot make it clear.

Mr. SOMERSET: But will you let me get my answer first, if you please? Previous sewage contamination is contamination which does not exist. Will you answer, "Yes" or "No"?

Witness: I cannot answer, "Yes" or "No," without conveying, I am afraid, a wrong impression about that.

Mr. SOMERSET: Does previous sewage contamination exist so that you can actually discover the contamination?

Witness: Certainly; it is founded upon the discovery of this contamination, which indicates previous sewage or manure.

Mr. SOMERSET: Then what you discover is not contamination, but something which indicates that contamination has existed?

Witness: When those animal matters with which water is liable to be contaminated undergo decay and oxidation, they are resolved into inorganic or non-animal matter. It is this non-animal matter—the skeleton, so to speak, of the original organic or animal matter—that we find in the water, and it is upon that that I reported.

Mr. SOMERSET: That is to say, that animal matter, which you say exists, is dissolved, and then is existing in non-animal matter?

Witness: Yes; just as you might say that the discovery of a skeleton proved the existence of an animal previously in combination with that skeleton.

Mr. SOMERSET: You do not find the animal matter, and you do not find the vegetable matter?

Witness: No.

By the COMMITTEE: I infer the fact of animal matter from the skeleton.

Mr. SOMERSET: But from nothing which exists in the sense of animal matter or vegetable matter?

Witness: No; that is, with regard to this previous sewage contamination alone.

Mr. SOMERSET: And, therefore, do you represent that it is in any way harmful?

Witness: Certainly not; this material which I find out in the water is not harmful. I know of nothing, in water or in sewage, that is harmful. That is the reason why chemistry cannot decide upon the harmfulness or otherwise of any sample of water, even if it be pure sewage. No chemist has yet discovered, in sewage or in water, any material which he can describe as capable of doing harm. If you mix with water the ejections of a cholera patient, and send this water to a chemist for analysis, he cannot discover in that water that there is anything hurtful. He finds a quantity of organic matter, but he cannot tell whether it is hurtful or innocuous.

The COMMITTEE: You cannot prove that it is harmful?

Witness: No; the harmful matter is beyond the reach of chemical investigation; it is a physiological question.

The COMMITTEE: It is like an infection in the air; you cannot discover the infection in the air.

Witness: Quite so; but on that account I think it important to know the extent to which water has been liable to contamination, which might bring into it those noxious ingredients.

Mr. SOMERSET: Without wishing to throw any doubt upon your evidence, you are not a medical gentleman, I think?

Witness: I am not.

Mr. SOMERSET: Did I understand you accurately when you said that you did not consider either the Dover Beck or the Basford good water?

Witness: Neither of those I consider to be of a sufficiently good quality for the supply of Nottingham.

Mr. SOMERSET: May I ask, as the one comes from wells, and the other from streams, what are we to do?

Witness: You must go to the millstone grit; but that is a point which I was not called upon to investigate. I merely reported upon that question.

Mr. SOMERSET: I ask you, as a gentleman of undoubted experience upon the subject, what is an unfortunate town to do?

Witness: Go to the millstone grit; all sewers are not the same.

The COMMITTEE: The North Riding of Yorkshire millstone grit?

Witness: It is the same kind of formation. It comes out within about 20 miles of Nottingham, I believe.

Mr. SOMERSET: I am told that there is no millstone grit within a reasonable distance of Nottingham.

Witness: Really, that is a point upon which I am not competent to speak. I am not a geologist.

Re-examined by Mr. BIDDER: Putting aside the millstone grit, I have no hesitation in saying that the Basford water is the better of the two. My objection to the Dover Beck is precisely the same as is made by the promoters and the town to the Trent water, in which no man can detect anything prejudicial to health.

By Mr. BIDDER: In the Dover Beck there is a quantity of nitrogenous or organic matter, which is the same kind as is present in manure and sewage.

W. A. Miller, Esq., M.D., LL.D., F.R.S., examined by Mr. BIDDER.

I am a medical man, but am not practising medicine. I have examined a specimen of water from the Dover Beck, but I do not know whether it was taken at the same time as that experimented upon by the last witness. The quantity of solid matter in it was 8·8 grains per gallon; the hardness before boiling 7·3°, and after boiling 4·6°. The Basford well water is harder than the Dover Beck; but in other respects, specially in regard to its organic contents, the Dover Beck is inferior to the Basford water, which I should say is the best and most wholesome, being free from organic contamination, while the Dover Beck is liable to it, and contained some at the time I analyzed it. There are nitrates and ammonia also, which latter indicates contamination by animal matter. If I could get a good spring water I should prefer it, and that is the difference between the Basford and the Dover Beck waters, one being spring and the other surface stream water. The liability to contamination cannot be avoided in an open stream.

Cross-examined by Mr. SOMERSET: I know nothing of the Dover Beck except the sample I examined, which had colour, and was slightly turbid. The Dover Beck is good water, but I prefer the Basford Springs a little.

Mr. SOMERSET: Do you agree with the last witness with regard to his theories about previous contamination and the skeleton?

Witness: I do not think that is a point which can be discussed here. There are differences of opinion. I do not agree with all that Dr. Frankland has stated.

By the COMMITTEE: Supposing a dead dog were thrown into a stream, I should think the trace of contamination would be very small, if the quantity of water were large; it might be so large that you would not detect the difference.

Cross-examination resumed: According to my analysis of the Dover Beck water there is a $\frac{1}{100}$th part of a grain of ammonia in a gallon of water. The nitrates are 0·126; therefore there is nearly five times as much in the Basford water as in the Dover Beck.

W. H. Ransom, Esq., M.D., examined by Mr. RODWELL.

I am physician to the general hospital at Nottingham, and have a knowledge of the wants and health of the district. I have studied the geology of the neighbourhood as bearing upon the question of water supply. I signed a memorial urging the discontinuance of the supply from the river Trent. I do not recommend the water of the Dover Beck, believing it to be liable, after a heavy rainfall, to be polluted by the water which flows over the somewhat steep slopes which form the gathering-ground, and which would collect the impurities placed upon the surface for agricultural purposes. On the last occasion when I was there the weather was moderately fine, and the water was rather turbid. My objections to the Trent water also apply to the Dover Beck, but in less degree. Filtration, if accurately and carefully carried out, would remove the turbidity and whatever might be held in suspension, but I do not think that such impurities as might be carried into it of an organic nature and matters in solution would be removed so that the water would be safe for domestic purposes. I think the water from the Basford well has the advantage of being much purer, and as regards its organic matter safer to drink, and not requiring filtration; that water goes through a natural filtration of considerable depth. Up to the present time I have never heard of a deficiency of water. I have seen an analysis by Dr. Letheby of the water from the Wilford bore-hole, and viewing the matter from the point of view of a medical man, I should say it is a very good water.

Cross-examined by Mr. SOMERSET: I know nothing about the Wilford water, except from having seen the analysis, and I have never analyzed Dover Beck. I agree with the evidence of Dr. Letheby and Dr. Odling as regards the health of the town. I did not analyze the Dover Beck water, because I thought Dr. Franklin's analysis would be better than mine. If this bill passes we shall have to drink the Dover Beck water, but I hope we shall not. In our memorial we desired to express an opinion clearly against one source which we had already tried, and which we believed to be very bad and injurious to health, but we did not wish to take the responsibility of recommending or condemning any other source. That memorial was a voluntary step, and was originated by me.

Mr. *J. Clutton*, examined by Mr. HUSKISSON.

I am land agent and receiver for a considerable portion of the Crown estates and some very large private estates. I have inspected the Epperstone estate, which is exceedingly nice residential property, well timbered,

having the advantage of the stream of the Dover Beck, which is an important feature, its volume and character as a trout stream giving it an exceptional value. I think the erection of the proposed works would be injurious to it as a residential property, both as regards the abstraction of the stream, the placing the sewage above the property, and the erection of the pumping-station. The result of those works would be to place it simply in the category of an agricultural estate. I assume that Woodbury corn-mill would also be destroyed by the abstraction of the water, which would also prevent a considerable portion of grass land on the borders of the Dover Beck from being irrigated, causing a serious loss to the property, as the power of irrigation adds value to the whole estate. There is no doubt you might be compensated under the Water-Works Clauses Act and the Lands Clauses Act, as a matter of mere ordinary purchase, but as a resident I do not think you can be. As a matter of enjoyment, I do not think the abstraction of that water can be compensated for by money. If the pumping-station had been placed below the estate instead of above, the injury would have been to a great extent avoided. I conceive the sewage would be much more profitable if put upon the land. It ought not to come into the beck at all.

Cross-examined by Mr. SOMERSET: The sitting-rooms in Mr. Huskisson's house face a contrary direction to the pumping-station. I have heard that the whole of the water would be abstracted; but it would not alter my views if I had evidence that there would be one-fourth of the volume of water remaining for Mr. Huskisson's enjoyment that he has at present. I should think Dover Beck is between 200 and 300 yards from Mr. Huskisson's house. I think the water could be seen from the drawing-room, although there are trees between.

By the COMMITTEE: The water is always the same, as near as possible.

Cross-examination resumed: I have not analyzed the water; but, so far as a surveyor's eye goes, it is a very pure and good stream. No liberal offer of compensation has been made; but I think no man would part with such a stream who had it. I would travel a vast number of miles to get such a stream. I cannot say I know the 6th section of the Water-Works Clauses Act; but I do not doubt that such a value as the mere compensation confers must be given. Liberality in your view and other people's views might be very different.

Re-examined by Mr. HUSKISSON: Supposing the stream from the tail of the mill should form a source of supply, the level of that stream is lower than the Dover Beck by 6 or 7 feet, which would unquestionably prevent your using that surplus for irrigation. The same difference would prevent your using it for ornamental purposes.

Mr. SOMERSET denied Mr. Huskisson's right to apply any of that water to his own use, and said his claim to do so was contested by the millowners below.

TUESDAY, APRIL 20.

The Right Hon. Sir *J. E. Denison*, Speaker of the House of Commons, examined by Mr. HUSKISSON.

I am acquainted with your property at Epperstone.

Mr. HUSKISSON: You were good enough, two years ago, to pay me a visit, and to give me some advice as to whether it was advisable to add to the house or build on a new site, and also as to turning the water of the Dover Beck to ornamental purposes, and you are now aware that the Nottingham Water Company propose to abstract the water of the Dover Beck from my property, and to erect a pumping station at 1260 yards distance from the house, with an engine of 500-horse power. Will you kindly state to the committee your opinion of the character of the property, and how it would be affected by the proposed alterations?

Witness: I should state that I became acquainted with the property at Epperstone under these circumstances: Mr. Huskisson is a land agent, managing my affairs, and not only that, but I regard him as an esteemed friend. He had asked me once or twice to go and look at his new purchase, and two years ago, as he was thinking of either adding to the present house or perhaps of changing the site, he asked me to go and look at the property and the place, with a view to my giving my opinion on that point. I went one day in the spring, and spent the morning there. Of course I took a survey of the place in a different manner from what I should have done if I had been merely casually passing by. I looked at the property from the house, and we then went down the valley and round to the bottom, and down to the mill (which I believe the committee know), and, in short, we surveyed the whole place. In my opinion it is a very remarkable piece of ground—a piece like which there are very few to be seen anywhere. In the first place, you have fine sloping grass land to the south. This land is scattered over with extraordinarily fine oak trees—such trees as only grow in two or three counties in England. They grow in the forest of Sherwood, of which this was no doubt part; there are these fine extraordinary trees upon this sloping grass land. If you want to see such trees, you might find a few in Windsor Park, but I do not know where else in the neighbourhood of London, or anywhere, you could see such trees. There is the fine grass slope, with all those very handsome oak trees, and at the bottom there is a fine trout stream. Now, it is the combination of all those three things which makes their excellence; the grass land without the trees would be comparatively common, and the grass land and the trees without the trout stream at the bottom would be very much wanting in completeness as a picture. I hardly know of 100 acres of grass land equal to this in beauty as a site for a residence. When I looked at this property, it was long before there was any fear of invasion from any distant quarter. Now, it is proposed to take away this stream. If the requirements of a great population make this absolutely necessary, the law says that individuals must give place to the requirements of large numbers. But then, I think, the law desires that private property should be respected, and that it should not be invaded without absolute necessity. I shall not enter upon the question of the necessity, because that is a question for the committee to judge of; they will hear all that is said about it. The corporation of Nottingham, I understand, object to the scheme, and do not see the necessity in the same light as others may. I should naturally look to the corporation of Nottingham very much as the guardians of the interests of the great community which is concerned. But to go back to the point to which I came to speak. Supposing it is necessary that this water should be taken, I think every consideration is due to the possessors of the property, so that it is taken in the least objectionable way. A great town seven miles off says, "I am going to take away your stream;" but in one way it could be taken in a comparatively unobjectionable manner, and in another way in a manner most objectionable, and I think that is a very fair case for the consideration of the Legislature who are going to give these powers. Now, I should say in this case, supposing the necessity is established, it would have been possible, by going a little farther down the stream, that the great injury to this property might have been avoided; but if, instead of going down the stream, you enter this valley, and put your enormous engine and high chimney at the top of the valley, and put them in a position where the prevailing west wind is always certain for about eight or nine months in the year to blow the smoke on to the house, garden, and grounds, I think that shows a want of consideration in the persons who promote this scheme, which does not entitle them to a very great consideration on the part of the committee. That is really the main thing that I have to say to this committee. I consider that to abstract this water from this valley and this estate will be a most cruel injury to it, and if it is done in a way most objectionable to the property, and with the least consideration to the owner, I think that amounts to tyranny, to enter upon a man's property, and treat it in that way. I certainly should not have come before this committee, and have given this evidence, unless I had had a thorough acquaintance with the spot, and a very strong opinion that the proposal is one which requires most careful consideration on the part of the committee in the way of treating it.

Mr. SOMERSET: Quite agreeing with Mr. Speaker's view, that this requires from the committee a very careful consideration, I do not propose to ask any questions.

The COMMITTEE: From your immediate knowledge of the town of Nottingham (we have had the evidence of the mayor of Nottingham before this committee), have you ever heard any general complaint, or anything like it, from the inhabitants, of any short supply of water, or with regard to the quality of the water—whether they are in any way badly supplied with water in the town of Nottingham?

Witness: I think I remember, at the time the cholera prevailed in this country, a paper was put forward showing the admirable supply of water in the town of Nottingham, and the great benefit that arose to the town from its being so well supplied; and, considering that the great river Trent runs at the foot of the town, there certainly seems to me to be a supply close at hand, which I should have thought would have been the natural source to look to for a supply of water; and, if anything is done in the way of the purification of rivers—which I presume certainly will be done—then, no doubt, that great source of supply (which is at hand, without expense, I imagine, to anybody) would be a great deal more valuable than it is at present.

Mr. SOMERSET (through the committee): What was the date of the cholera time to which Mr. Speaker refers?

Witness: Possibly it was five or six years ago: it was some few years ago, at all events. I do not profess to speak with any accurate local knowledge of the town of Nottingham with regard to its details, but certainly I think I cannot be mistaken in saying that I have seen, in the sanitary reports of the town of Nottingham, very great stress laid on the prodigious advantages which result to the town from its copious supply of water. I cannot remember the date, but I think I can speak accurately to the fact, that the town of Nottingham prided itself on its abundant supply of water.

Mr. *Hawksley* recalled, and examined by Mr. BIDDER.

Mr. Thackeray, no doubt without any intention on his part, omitted all the mortgages of the year 1867. The company's published accounts (which were all that he had) show year by year the mortgages for the year, and not the accumulation of the mortgages. Mr. Thackeray omitted to look at the preceding year, and therefore left out the sum of £6030. There were £9450 of new mortgages issued in 1868; those are brought into the account as a receipt from debenture bonds, but Mr. Thackeray mistook that to be the accumulated amount of the debenture bonds. It is only the sum we received in that year.

The COMMITTEE: But is it not the practice, in showing these accounts to the clerk of the peace, to show the full indebtedness of the company?

Witness: No. The Companies Clauses Act distinctly says that it shall be the receipts and expenditure of the year. I have the Act, so there can be no doubt about it.

Mr. BIDDER: With that explanation I think the matter may rest; it appears probable that Mr. Hawksley is correct.

M. O. Tarbotton, Esq., examined by Mr. BIDDER.

I am a civil engineer, a member of the Institution of Civil Engineers, and a Fellow of the Geological Society. I have been for the last ten years surveyor to the corporation of Nottingham. I have given the scheme of the water-works company now before the committee a very careful consideration. We calculate that the area of the company's district at present is 11,390 acres, containing a population at the last census of 119,159; but of course that has now increased, and my estimate now is 135,000. The area proposed in the new districts is 40,778 acres, containing a population of 24,137 according to the last census; now it is 24,352—an increase of 217. Many of the places proposed to be supplied have a very small population. I have calculated the supply of water to the new district, if every house were supplied, and I think it would be altogether unremunerative; but it is very unlikely that will be the case. Most of the people have pumps, from which they get good water; it is rather hard, but they are quite satisfied with it. With regard to soft water, it is the most common thing throughout the whole district to collect the rain water in tubs. If any loss in supplying the new district occurred, no doubt we should experience that loss in the town of Nottingham. I have taken a daily register of the rainfall at Nottingham.

By the COMMITTEE: I took that register from three portions of the town. In 1868 the rainfall was 25·231 inches, and in 1867 it was 29·904 inches. The average for the last 25 years has been 25·3 inches. The mortality at Nottingham is about 23 or 24 in 1000.

The CHAIRMAN: We are all agreed that the town is very healthy.

Examination resumed: I think that for many purposes connected with the town the use of the Trent water would be very desirable.

Mr. BIDDER: Mr. Hawksley stated that the Trent water goes through the middle of the town in a separate pipe. Therefore, taking that statement, so far as that water is separate there would be no difficulty in making the water available for other than domestic purposes?

Witness: Whether that be the fact or not, it is quite clear that a distinct pumping-main might be laid from the Trent Water-Works to the Park Road reservoir, which would enable the lower part of the town, or nearly so, to be supplied distinct from any new source. The lower part of the town rises rapidly from the Trent; there is a very large area, which would come under the Park Road reservoir.

Mr. BIDDER: The Lenton sewage has been talked of as going into the Trent. Do you know whether steps are now being taken to divert it from the river?

Witness: Yes. There is a ditch which has long been a very great nuisance. This ditch drains a portion of Lenton, and only a portion of it—what is called Old Lenton, where the amount of pollution in the shape of water-closet refuse is not extensive; of course it produces a nuisance, because there is refuse from a tan-yard, and so on, and this now goes into the river Trent, and the Lenton people have been called upon on many occasions, by the Town Council, to combine with them and with trustees of the late

Duke of Newcastle to carry forward an intercepting sewer through a part of the Lenton parish, and all along the Lene valley, a little to the left of Nottingham. Steps are now being taken to intercept this sewer, and I am now preparing plans, on behalf of the Lenton Local Board, to intercept this drainage of Lenton, and bring it through one main sewer, and enter the Trent below the water-works, where the present outfall of the drainage of Nottingham joins the Trent; so that I believe the Trent will get better every year. I have a very strong opinion that the Trent works ought not to be hastily abandoned. I have got a sample of the Trent water taken under the most unfavourable circumstances [producing a bottle], after a period of dry weather. With regard to the additional supply for the town, I think that, next to the Trent (assuming that that is not favourable at this moment), the most natural source, the most pure, and the most economical, is the new red sandstone. My judgment is that in a well-selected situation a supply of from 1½ million to 2 million gallons a day might be obtained from one well. I know three very favourable positions, which I think would give that supply. Bestwood—which Mr. Hawksley pointed out—is a very likely spot; but there is another situation nearer, 1¾ mile from the Bagthorpe station.

Mr. BIDDER: Comparing that water with the water proposed to be taken under this bill, which, in your judgment, is the preferable water, setting aside all question of cost, for the further water supply of the town?

Witness: I prefer the well water. I have also here specimens of the water from Bagthorpe Park and from Dover Beck [producing them].

Mr. BIDDER: I see that there is some slight discoloration in the Dover Beck water; is that its usual peculiarity?

Witness: The water was taken after a period of dry weather, and therefore I consider it exhibits the most favourable condition of the water.

Examination continued: The superficial character of the district is exclusively agricultural, and the soil is loose and porous; in fact, it is a sandy soil, except a portion to the north-east, which is on the marls, and is in a very heavy soil. The land generally lies very steep, which makes it liable to be scoured by heavy rains, washing the manure or other impurity from the land into the brook. In times of heavy rain, the water is the colour of red ink from the marl. The land requires much stimulating manure, and there is a danger of contamination from that being washed into the stream. I apprehend the scheme of the company will involve very great compensation to the millowners, which, of course, would be entirely avoided if the supply were drawn from the underground stratum. My estimate for works which would supply 1½ million gallons is £36,000.

The COMMITTEE: That must be a speculation. You cannot be certain of supplying 1½ million gallons.

Witness: We have reasonable grounds to believe it would. We know the whole of the conglomerate beds of the new red sandstone are full of water, and wherever wells have been sunk we find there is water; and there are innumerable wells in Nottingham all deriving water direct from that source.

Mr. BIDDER: Mr. Hawksley has taken credit in his scheme for the sum he would realize by abandoning the Trent works, but that would be equally the case if he drew his fresh supply from the sandstone?

Witness: Yes.

Mr. BIDDER: Taking credit in the way Mr. Hawksley does for works to be abandoned, the cost of a well sufficient to give a supply, exclusive of the Trent and Scottholme works, of 4½ or 5 million gallons, would be, after giving that credit, absolutely nothing?

Witness: Yes.

Mr. BIDDER: As against a net cost of £150,000, after giving credit for the £36,000 under this bill?

Witness: Yes.

Mr. BIDDER: Assuming one such well to be sunk, for how many years would that provide water for the wants of Nottingham, if you raise the supply to 4½ or 5 million gallons?

Witness: For ten years, at least.

Cross-examined by Mr. CLERK: In the cost of a well I include the sinking, land, engines and boilers, pumps, and pipes, up to the summit of the present high-level reservoir of the company at Mapley. The site I selected is the one near Five Mile House—the one alluded to by Mr. Hull yesterday. It is out of the district of the water company, and they have no power to go there at this moment. The length of main would be about 7000 yards to the reservoir. I should sink a well of from 40 yards minimum to 70 yards maximum in depth. I know the neighbourhood of the Goose Dale works, and should say it is very likely there is a well there 200 feet deep, as those works are on the top of a high hill. The water which collects on the high ground breaks out in springs, either in the valley of the Lene on the one side or the Dover Beck on the other. If we were pumping this water, we should to a certain extent be drawing off the water from those streams.

Mr. CLERK: What do you mean the Scottholme and the Trent works to yield?

Witness: One million gallons. I have taken Mr. Hawksley's figures, and I say that the Trent is equal to 600,000 gallons; that makes 1 million gallons. Then I take the Lower Park stream at 900,000, and the Basford well, 1,760,000; that makes the total of the present supply 3,650,000 gallons, and when the works at Basford are developed and complete, the yield will be increased by 750,000 gallons. I therefore get a total supply of 4,400,000 gallons; but, if the Trent and Scottholme works are abandoned, it will leave 3,400,000 gallons. Then, if you add 1½ million to that, as the yield of one well only, that makes about 5 million gallons. Now, if you take the present population at 135,000, which I know it to be, you require for that supply 3,375,000 gallons. I hold 25 gallons per head per day to be sufficient; therefore, on that principle, the present population would be well supplied by 3,375,000 gallons; that is, in fact, identical with the present supply of the company, and that is also conformable to Mr. Hawksley's statement that, at the driest period of 1868, the total amount of the water consumed was 3,445,000 gallons. That shows to my mind that the population is at present supplied by the present resources of the company. Then I take the population in 1881 to be, allowing for a natural increase, calculated in the most liberal manner with the increase of the last ten years, which has been exceptional, at 184,400; that, at 25 gallons per head, would amount to 4,610,000, or 300,000 gallons within the amount which the company would have.

Cross-examination continued: If Mr. Hawksley has proved that the people of Nottingham obtained 30 gallons per head per day in the driest weather last summer, I should say that 10 per cent. at least has been wasted. I have taken 2½ million gallons as the future supply of the Basford well from the evidence of Mr. Hawksley on this subject, both here and in the case of the Birmingham Water-Works bill. This well is instanced as one which yields 200 gallons a minute. I was in office when the gas bill was passed, a year or two ago, and was a witness.

Mr. CLERK: You no doubt gave the same evidence you do now, that it would be most unprofitable to the gas company to adopt a larger area?

Witness: I said quite otherwise. It was proposed to embrace a district like this, but rather larger. I said it would not pay to have the gas taken there, and it has not been taken to most of the places, although to two or three it has.

Mr. CLERK: Will you tell me one place, or any small town population, where the gas has not been taken?

Mr. ENFIELD: Does the committee think that the revenue of the gas company should be gone into?

Mr. CLERK: We are not going into the revenue of the gas company, but we hear the same argument used by the corporation of Nottingham now as we did then.

Mr. ENFIELD: This is the first time the corporation have ever appeared to oppose the Nottingham Water-Works Company.

Mr. CLERK: Was it not the case that the same argument was used by the corporation of Nottingham—that it would be very unprofitable for the gas company to extend the area of supply to any of the outlying districts?

Witness: That argument was used, and is perfectly sound.

The CHAIRMAN: We have heard enough about the gas-works.

Witness: But it is only fair the committee should know there is a differential rate for the outlying districts.

Cross-examination resumed: If the new area were included in the limits of the water company's supply, it would be a loss both to the company and to the inhabitants, because if all the houses in the new district were supplied it would not pay more than 3½ per cent. on the cost of the ripage only, and if the same dividend were maintained by the company the extra loss must fall upon the people in the town.

Mr. CLERK: There is no power sought to raise the charge, is there?

Witness: No; but the charge can be raised for all but domestic purposes to any extent. The rate for domestic purposes is a little below the maximum; that rate might be raised to-morrow. My proposal to keep the main which now supplies the lower part of the town to supply the Trent water into the reservoir at Park Road was merely suggested as a very simple arrangement—that is to say, to put a separate main from the Trent works to the Park Road reservoir for the Trent water supply, and to attach the main which now exists between the reservoir and the Trent works to the pipes of the other reservoir. The Basford water, which is received into the same reservoir as the Trent water, might be cut off.

Mr. CLERK: In that case you must construct a new reservoir, must you not, to receive the Basford water?

Witness: There is land there, and the cost would be very small. It is not a reservoir to store water, but simply to form a head. A fresh set of mains would have to be laid down for supplying the lower part of the town below the Park Road reservoir towards the Trent.

Mr. CLERK: Do you know that the mains which bring up the water from the Trent to the Park Road reservoir are also the same mains which are used for the distribution of the water from the Park Road reservoir?

Witness: Yes.

Mr. CLERK: But if your scheme was adopted of using those mains for the purpose of carrying the Trent water up to the reservoir, to be devoted to street-watering, and so on, they would not be available for distributing water for the houses?

Witness: No; I would have another main.

Mr. CLERK: You would have another main and another reservoir in Nottingham; in fact, you would require a complete new system of service for all the lower part of the town?

Witness: We should want distributing-pipes. I merely suggest this roughly. I have not gone into the estimate upon it.

Cross-examination continued: The people of Lenton concur in my scheme for discharging the sewage below Nottingham, and are making arrangements for that purpose. I am not aware that the people of Beeston are now complaining of the filthy state of the water they get in consequence of the sewage of Nottingham being discharged into the Trent; but the sewage is a great nuisance, and steps will have to be taken shortly, and ought to be taken, to prevent that.

Re-examined by Mr. BIDDER: The 66th section of their Act provides that the domestic supply shall not include baths, water-closets, horses or cattle, or washing carriages, so that for all these purposes the company may charge what they like. The next section provides the limit of a separate charge for water-closets; where the rack-rent is not more than £10 it is 8s. for every water-closet; then 10s., 12s., 15s., and up to 20s. The principle on which the water-rate is made now is that of rental.

Mr. HAWKSLEY: When the annual rent of the house does not exceed £10 it is 1s. per quarter.

Mr. BIDDER: The first limitation in the 60th section is that where the rack-rent does not exceed £20 per annum, they may not charge more than £5 10s. per cent.—a little over 1s. in the pound. For a house at £20 per annum they charge quarterly 5s., which would be £1 a year; that would be very near the maximum.

Mr. HAWKSLEY: If it was £5 10s. it would not be quite the maximum. It is a very low maximum for ordinary domestic purposes.

By the COMMITTEE: The Trent water is hard, and that is objectionable for domestic purposes, but it is very common in all the new houses in Nottingham to store rain water; therefore I believe water for domestic purposes is quite sufficiently provided in that form, and the manufacturers also have wells which produce soft water. [Witness handed in a statement showing the population of the present and proposed districts, and the mortality of several large towns.]

J. S. Norris, Esq., examined by Mr. BIDDER.

I have practised as an engineer and architect for 28 years, and know the town and district thoroughly. I have considered the present scheme of the company for the extension of their water supply. I think the distance from which the water of the Dover Beck will have to be fetched, and the fact that it will all have to be filtered before it is fit for use for domestic purposes, and owing to the large amount that will certainly be paid for compensation to half a dozen millowners on the stream below, the scheme would be unduly costly; and, in my judgment, the preferable plan would be to take from the sandstone on the northern side of the town such a new supply as the circumstance of the district may demand.

Mr. BIDDER: Speaking from your own knowledge of the district, what is your opinion with regard to obtaining such further supply in the immediate neighbourhood of the town in sinking wells?

Witness: I take exactly the same view as Mr. Hawksley took when he gave evidence on the Birmingham case, based on the facts of our experience of the Nottingham wells. He expected to obtain 1½ million gallons per diem in eight wells at Birmingham, and the sandstone in the neighbourhood of Nottingham is peculiarly favourable to a large yield of water.

Mr. CLERK said it was a most irregular thing for the witness to go into this matter.

The CHAIRMAN: It is irregular, because the evidence is not before us.

Witness: From my own knowledge of the sandstone rock in the neighbourhood of Nottingham, I can say that there is a very large yield of water.

Mr. BIDDER: Now, with regard to the present supply, you are not here to say that the Trent water is absolutely pure water, or the best that can be obtained; but is there any such badness in the water at this time as to necessitate immediate steps to bring water from elsewhere at any cost?

Witness: I have never heard any extensive complaint with regard to the Trent water. The chief complaint is on the part of those who have steam-engines and boilers; they complain of the hardness of the water. It is quite certain that it does form a concretion inside the boilers, but that is not so great a practical difficulty latterly as it was years ago, because as manufactures increase, and new factories are constructed, it has become a common practice to construct large cisterns under the factories, or close to them, for the purpose of storing the rainfall on the premises, and that water is used for pumping into boilers in many cases. I do not think there is the least prospect of the supply of the proposed district being remunerative. About £3 3s. 6d. was the return of what would be derived from the expenditure for mains and other works if the whole district were supplied, and that does not include any part of the cost of pumping the water.

Cross-examined by Mr. CLERK: I have constructed works myself, and have been engaged on others. Some of the wells at Nottingham are shallow and some are deep—quite 200 feet, I should say. The quantity of solid matter is very large in the wells under the town. Some of the wells cause concretion in boilers more than others. The Trent water does the same. Hard water is very objectionable for dyeing purposes; but the dyers of Nottingham use both the Trent water and the well waters, without any serious complaint. The water is necessarily boiled in dyeing.

Mr. CLERK: Supposing you had to sink shafts into the sandstone, you would diminish the springs which now break into either the Lene or the Dover Beck, would you not?

Witness: No; or at least to a very trifling extent. The two waters are distinct; the water in the wells is one water, and the water in those surface springs another. There is a certain portion of the water which goes into the lower measures which remains there, and is then lifted into the wells. These waters all come from the rainfall, but the water running down the stream is water of a somewhat superficial character; it only passes a certain distance through the surface.

The COMMITTEE: What do you think becomes of this water, if you sink a deep well?

Witness: That water gets lodged in the fractures of the sandstone. It is so deep down that practically it does not come out.

The COMMITTEE: If there is a continuous flow, it must come to the surface somewhere.

Witness: That is beyond all tracing, as far as my experience goes. The water is always there for pumping; at least that is the case with regard to the rock in the neighbourhood of Nottingham.

Cross-examination resumed: The upper water breaks out into the stream by springs, and there is a certain quantity bottled up in the strata below. If we once got down to that we should not exhaust it, because it would be replaced by the rainfall coming down from year to year.

Mr. CLERK: But if you sink wells, and pump this water, which is the production of the rainfall, you prevent it going into the springs or getting down into your reservoir at the bottom, do you not?

The CHAIRMAN: I think we are getting beyond our depth.

Re-examined by Mr. BIDDER: Old Basford has been within the company's powers of supply since 1845.

Mr. BIDDER: My learned friend, Mr. Clerk, says: "We have no water." You have heard Mr. Hawksley say that with the maximum demand last summer he had a surplus of 1 million gallons.

Mr. HAWKSLEY: I said 200,000 gallons.

Witness: There was a surplus.

Mr. BIDDER: I have no doubt that it will be in the recollection of the committee that Mr. Hawksley said that last year there was a surplus of 1 million gallons.

Mr. CLERK: If you will point that out we shall be very much obliged to you.

Mr. BIDDER read the evidence on the question, upon which

Mr. HAWKSLEY said that quantity had not been realized, as the engine was not finished.

The CHAIRMAN: Let us see whether Mr. Hawksley's evidence did show that 750,000 gallons has been realized, for he says: "We have exhausted the well; we have put down a temporary engine of 80-horse power, as well as this permanent engine; and by means of that large temporary engine, we have ascertained what the well yields. We can get—I cannot say for how long, because the water always increases in those wells by the pumping down of the bed of water—I say we may get 2½ millions of water instead of 2 millions, and that will enable us to tide over the time until those new works, if they are conceded to us, are made; and then, of course, we shall be on velvet." That is the expression—"We may get 2½ millions of water instead of 2 millions," by this course.

After some further conversation,

Mr. CLERK said he hoped his learned friend was satisfied he was in error.

Re-examination resumed: The cost of a well is always more or less elastic, because no one can tell at what level the water will be reached, or how far operations may have to be carried on to get at the water. I have taken the well at £2500, and calculated it as 80 yards deep; but, if it were deeper, the cost would not be greatly increased, as it is merely dry sinking for the additional depth. It is the upper crust that is costly. Another £1000 would carry it down very deep. The diameter would be the size most convenient for pumping the water—say 6 feet. I have examined Mr. Tarbotton's estimate for the entire cost of the well—from £30,000 to £36,000—and entirely agree with it.

Cross-examined by Mr. CLERK: The greatest quantity of water I have known got out of a well in the sandstone rock has been at Bagthorpe and at Ropewalk Street. The wells I have sunk have been simply town wells for supplying factories and so on. Every manufacturer in Nottingham sinks a well to get the water he wants, and if they happen to be drained by adjoining wells, another yard or so of sinking gives him all he wants.

Mr. *J. Taylor*, examined by Mr. BIDDER.

I am a civil engineer, and have had 30 years experience in designing and carrying out water-works. I do not think there is any immediate necessity for any such expenditure, or for such a proposal as the present one of Mr. Hawksley's to supply Nottingham from the Dover Beck. I think Nottingham might be supplied, for 10 years to come, with water from the sandstone, in the way proposed, at a much cheaper rate; and probably by that time the Trent would be in a sufficiently good condition to become the permanent supply. I believe the Trent reservoir works to be capable of improvement. If the water were taken from the Trent itself, and filtered in the best possible manner, I believe it would be very fair and good even in its present state. I think from 1½ to 2 million gallons might be got from the sandstone in the district. I agree with Mr. Tarbotton as to the cost of sinking.

By the COMMITTEE: In the neighbourhood of Nottingham, to sink a well 200 feet deep and 6 feet diameter, I should think might average about £10 per foot. For a well 100 feet deep, the cost would be about £7 or £8 per foot, because the quantity of water would increase as it went down, and of course that would increase the cost of pumping.

Cross-examined by Mr. CLERK: If I were constructing works for the supply of Nottingham from the Trent itself, I should take a pipe above the bathing-station—Lenton, in fact. To get, say, 1 million or 1½ million gallons of water from a well, I should begin the upper part of the well larger than 6 feet in diameter—about 8 or 10 feet. In the £2000 as the cost of sinking a well 200 feet deep, I include the cost of the temporary engine.

Mr. CLERK: Do you remember a case with regard to the Gorton Water-Works, near Lancaster—what the result that was expected was, what the result was at first, and what the result was afterwards?

Mr. BIDDER objected to the question.

Mr. CLERK said it was most material, as they had the same formation here, and they were driven to speculate, to a certain extent, whether a certain quantity of water would be obtained.

Mr. CLERK: Is it a fact that you expected to get 2 millon gallons a day from a well which was sunk there?

Witness: I believe at present they get 800,000 or 1 million gallons a day, but I do not remember at all what the anticipation was. Judging from the experience I have had, I should say that is not the common result. The Liverpool wells, I believe, increased very considerably in the quantity of water.

Re-examined by Mr. BIDDER: I should think from the different places mentioned in the district from 1½ to 2 million gallons would be obtained very freely.

Mr. *T. S. Wolley*, examined by Mr. BIDDER.

I am land agent for a great deal of property in Nottingham. I know the Dover Beck very well. I have prepared a plan showing the district, and the way in which it is divided between the sandstone and the marl. [Plan produced and described.] It is rather a highly farmed district.

By the COMMITTEE: I should think the light lands would let for about 26s. per acre; and the others vary extremely in quality from very strong clay land to very good loam.

The COMMITTEE: It must be very inferior land to command no higher rent than 26s. per acre.

Witness: It is the creature of high farming. In the Nottingham Forest, land which is very highly farmed, the outlay is so great on artificial manures, and so on, that the rent is proportionately low.

Examination resumed: There are about 13,700 acres in the whole district, of which about 700 are grass lands and the sites of the villages. Nearly the whole of the waters from the clays and loams, about 300 acres, would find its way into the beck.

Cross-examined by Mr. CLERK: The water finds its way along the surface from steep declivities. The soil near the pumping-station is very light.

Mr. CLERK submitted that, questions having been put by the other side on matters to which his attention had not been called, he was entitled to call evidence in reply. As to the quantity of water going from Wilford, Mr. Hawksley had been asked certain questions in cross-examination, which he wished to reply to.

The CHAIRMAN said the committee would consider that there was a denial on the part of Mr. Hawksley of the fact of there being any large quantity to be had at Wilford.

Mr. HOPE SCOTT then addressed the committee on behalf of the corporation of Nottingham. He said he might claim credit for that corporation, that it was not a litigious one; it rarely appeared before Parliament—too rarely, indeed, for a wholesome state of matters; and they had endeavoured to settle with the water company on this occasion without doing so. Among other questions which had been put by the corporation to the company was one with regard to the raising of the present capital, and about that no answer had been vouchsafed. They were asked whether or not they proposed to raise the capital which they could now raise at 5 per cent., and they refused an answer on that subject. Mr. Hawksley had told them it was an idle question, because Chancery and the common law obliged them to raise that capital in the first instance. If they referred to the Act they would find it was tied down by such words as these, "that the money shall be applied in carrying out the purposes and objects" of another Act, and therefore it was inadequate for the purposes of the present bill. Their capital, as fixed by Parliament, was £250,000 in shares, and there was £40,000 loan capital; making together £290,000. Of that capital there was (and he was taking Mr. Hawksley's figures) unexhausted, share capital £45,000, and loan capital £24,000; and now, for the purpose of his (Mr. Hope Scott's) present statement, he would take another figure—not really raised capital, £75,000. The committee would remember that Mr. Hawksley had said it was thought convenient in 1854, for the purpose of having all the shares of the same nominal value—viz., £50 shares, bearing 5 per cent. interest—to duplicate the then existing capital of £75,000. That was all the money which had been spent up to that time; the other £75,000 represented a financial operation which Mr. Hawksley said was directed to uniformity of capital, which uniformity, by the way, supposing no obstacle stood in the way, seemed to create, under this bill, a 7 per cent. capital. That was Mr. Hawksley's account. The account he (Mr. Hope Scott) should give was that with that £75,000 of share capital it might have been expected that a dividend of 10 per cent. would have been paid. It never did reach that amount, because Mr. Hawksley said very wisely, "If we reach 10 per cent. there will be an outcry, and people will say, 'Look at the money they are getting out of the town of Nottingham!'" They therefore reduced the dividend, so that they should appear before the public, and before generations who would not remember the former operation, as merely claiming 5 per cent. That was the history of it, and he put it before the committee merely to explain how it was that the £75,000 had never been raised. The figures, when put together, produced the sum of £144,000; and if they subtracted that from £290,000—their total nominal existing capital—they would find that £146,000 was all that had been actually spent on works for supplying Nottingham with water, except the sum of £13,600 which had been produced by the sale of shares at a premium. What had Nottingham got by that? They had an abundant supply—there was no doubt of that. Last summer there was no stint—no difficulty. Other towns were dying of thirst, but Nottingham was not even prevented from watering its streets; and certainly no one

ever anticipated that a new bill would be started on account of the general motive which had prevailed elsewhere—the word "elsewhere" meaning some small places where the water had been shortened, in some instances, to an extent almost dangerous to life—and certainly Nottingham had no reason to suppose that the shortcomings of other places would have been called in aid of a bill like the present. The supply of Nottingham was partly from the river Trent, and that river had been condemned by the medical profession on the general principle that when once fœcal matter was poured into a river, it was never certain where it would show itself afterwards. No doubt there was a great deal of truth in what had been said on that subject, but at the same time there was a great deal of exaggeration. When the cholera broke out at the east end of London, the charge was made against the East London Water-Works that they had pumped polluted water into the district, and that cholera was the result. There had been long inquiries into that matter, and it was found that a great deal more depended upon the impure state of the houses, and the bad condition of the cisterns, than upon anything which could be traced to the river Lea, although that river was much more charged with sewage than the Trent. Mr. Hawksley, again, held that a certain amount of dilution might void any evil effects from rivers used for purposes of domestic supply, and he was hopeful that the time would come when those rivers might be further purified. He (Mr. Hope Scott) thought that time had come. At any rate they knew that London depended for its water supply upon two rivers, and they knew that until lately into both of those rivers a large amount of fœcal matter was poured, which fœcal matter had, no doubt, more or less, but not entirely yet, been removed. He would assume that the Trent water was not the best water to be found. The committee had heard Mr. Speaker upon the subject, and they knew what he thought of the Trent water. They were bound to defer to science, although there was no public outcry upon the subject; and he, for one, bowed to the grounds given by medical witnesses. But his case was complete without it. He would proceed upon the assumption that the view that the Trent was to be absolutely departed from was not a wise one. They knew that the population of Nottingham were also scrambling for a supply of water, and they might depend upon it that, if Nottingham once lost its hold upon the Trent, it would not be easy—especially when the river had been much improved, as the River Commissioners were at present seeking to improve it—to recover it again. Passing away from the river Trent, let them see what the case of the supply was. He had cross-examined Mr. Hawksley himself upon the subject. [Mr. Hope Scott here read the evidence.] The town had got for £160,000 all the water they required within a very slight fraction. He was told 400,000 gallons must be given up—viz., the Scottholme Springs; but they had been good springs for a considerable time, and except for the larger pollution attributed to them, they could not do better than go on with those springs. A liability to pollution was all that was pleaded about them; an actual pollution had not taken place. But what had they got for their money up to the present time, and what money was to be spent to do something more? The committee must remember that 3½ million gallons was the maximum in the driest summer they had had for years, and that quantity could not be got from the wells at Basford and Sion Hill. It was admitted there was a small deficiency, but taking those two wells upon their average yield, and looking to the average supply of the town, it would be found that they stood pretty much in this relationship to each other: 2,900,000 gallons to be produced from the two wells; and the supply, if they took Mr. Hawksley's own figures, was a supply of 125,000 inhabitants at 30 gallons per head. There had been a general looseness—if he might be allowed the expression—about the actual corporation supply; but he believed Mr. Hawksley gave 25,000 houses as being actually supplied, and 150 gallons per house as the ratio of supply, and if those houses were multiplied by 5 they would get 125,000 inhabitants actually supplied at the present moment.

Mr. HAWKSLEY: The actual quantity I delivered was 3½ million gallons, to be divided by 125,000, which comes to about 28 gallons per head.

The CHAIRMAN: The question between 28 and 30 gallons is not very material.

Mr. HAWKSLEY: But there would appear to be a little discrepancy in the quantity of water.

Mr. HOPE SCOTT: I find different modes of statement in different parts of the evidence. I took that which appeared to be the simplest. For the moment it does not much matter whether it is 28 or 30; it includes trade supply, which is only one-fourth of the whole, as against three-fourths for domestic purposes.

The CHAIRMAN: And it includes watering the streets?

Mr. HAWKSLEY: It does.

Mr. HOPE SCOTT said they then came to the question what they were to get, and what money was to be spent for it. All that capital—and there remained £69,000 of unraised share and loan capital, cost the company no more than £5 at the utmost, because they knew that £5 shares sold at £6, and that the loan capital was raised at 4 per cent. or a little over. That was the capital on which they were paying at the present moment, besides paying on £75,000 which had never been spent for the benefit of the company, because it arose from the duplication of the shares, that £75,000 being again reducible by the counter element of the sale of shares, which produced a bonus of £13,000 odd, so that they were paying at present on upwards of £60,000 which had never been spent for the benefit of the town. It was proposed by the bill to raise a capital of £150,000 in shares, and a loan capital equal to one-fourth of the capital raised at the time and paid up. When the whole was raised it would amount to £37,500. In other words, the bill sought to give to the company a power of raising by shares and loans £187,500, which was not very far short of a duplication of the whole of the authorized capital, so far as it was real capital. Taking the £47,000 of unexhausted share capital, and £24,000 of unexhausted borrowing power—that was £69,000 of dormant finance—and adding it to the £187,500 sought to be raised by the bill, would give £256,200 as the money power of the company the moment the bill received—if it ever did receive—the Royal Assent, and that in respect of a water supply which had hitherto been sufficient, and even if reduced would not be very far from sufficient, the actual cost of which was £159,600. What could have led to this tremendous operation? Had it been some wonderfully rapid increase? There was no evidence at all of that. There was no drought last summer, nothing apparently except the suggestion that the Trent water was not fit to be administered to human beings on account of its present pollution, and they were asked to submit quietly to a bill proposing this wonderful capital without any apparent cause of necessity or pressure adequate to the support of the demand for one tithe of that capital. Perhaps the latter expression was too strong; but, at all events, one-fourth or one-fifth of that capital would be amply sufficient, on the showing of the promoters themselves, to do all that was at present required at Nottingham. And how was it to be expended? They were told in the first place that the scheme was to be divided into two sections; the first and immediate expenditure being £114,000 less the setoffs to be obtained in giving up the hold upon the Trent, which Mr. Hawksley said would reduce the immediate expenditure to £80,000, without which sum, as he (Mr. Hope Scott) understood the evidence, no water could be got under the bill. If they wanted an extra gallon of water beyond the present well supply, this £80,000 must be paid for it. True Mr. Hawksley said he wanted 3 million gallons, but he also said that amount must be spent to obtain one gallon extra. Then what were the company going to do with the 3 million gallons when they had got them? They were in possession of 2,900,000 gallons already, and the utmost supply hitherto had been 3,400,000 practically, which was only half a million short. Mr. Hawksley was going to create new consumers for the purpose of helping with those 3 million gallons, which would be evidently in excess of the wants of the town, for he was going to pick up in the district, as he said, 24,000 people. Supposing he gave 30 gallons a head to the 24,000, that would require 720,000 gallons as the utmost in that case. That 720,000 added to the half million that the town needed would be between 1,200,000 and 1,300,000 gallons; that would be all for which they could find employment, all the rest was for the future, and speculative. Mr. Hawksley said the people would double in the course of 30 years, but if that were compared with Mr. Barber's evidence, it would be found that that ratio of increase had not been kept up, and in fact was not going on at that moment. Mr. Barber said the increase between 1851 and 1861 was over 60,000, and that the increase since then had been 10,000.

Mr. HAWKSLEY: No; that is only in the town of Nottingham proper.

Mr. HOPE SCOTT said the town of Nottingham proper represented 84,000 out of the whole 125,000. He would take Mr. Hawksley's own figures. He said that in 30 years the population of the town of Nottingham will have doubled, but what would he do in the 10 years? Would he have absorbed the supply to be obtained by the capital he was seeking to raise under the bill? He certainly would not, for some considerable portion of those 10 years, for they were now in 1869, and knew what the population was exactly now, and he would not have exhausted £80,000 of capital and the supply which was to be given thereby. Therefore it was a puzzle why they should have proposed a scheme of this kind. They sought to raise a 7 per cent. stock for the purpose. While their credit was good they had not to raise money at more than 5 per cent. at the present time. Either the scheme was a good one or it was a bad one. It did not look a profitable one for a 7 per cent., one would say, since they were keeping the old consumption, and merely substituting an additional supply where there were no consumers to take it; and yet, on the other hand, Mr. Hawksley said he wanted the 7 per cent. in order to distribute it amongst his shareholders, and that it would be a good thing for them. He (Mr. Hope Scott) could not help thinking that what was in view here was something more important than appeared on the face of the bill. He was sure that the scheme as it stood was not one wholly adapted to the present and growing wants of Nottingham. In one point of view the expenditure would not be profitable, and could not return the 7 per cent. on stock issued to the shareholders; but they held to it, and attached a value to the 7 per cent. stock. Why could it be? He would make a suggestion. It was not the first time Mr. Hawksley had dealt with companies who had sold their works, and supposing in a year or two the tendency which was now general should be developed in Nottingham, and the corporate authorities should purchase the works, they would have to buy out shareholders entitled to a 7 per cent. stock. That was his (Mr. Hope Scott's) way out of the difficulty on the one hand, and it did not appear the thing was likely to be remunerative on the other. The holder of a 7 per cent. preference stock would also be in a better position than the holder of a 5 per cent. stock, and without any obligation to sell by auction. With regard to the 5 per cent. stock, Mr. Hawksley said that the 5 per cent. limitation was a voluntary act for the purpose of uniformity; but the mayor and Mr. Thackeray, on the other hand, distinctly remembered that the corporation insisted upon the 5 per cent., the company beginning by asking for 7 per cent. That conflict of testimony he (Mr. Hope Scott) could only explain in this way, that Mr. Hawksley, although no doubt very influential in the affairs of the company, was neither the chairman of the company, nor a director of the company, nor the secretary of the company. With regard to the other question—that of sale by auction—Mr. Hawksley's evidence failed in satisfying him (Mr. Hope Scott) as to how the compulsory sale by auction crept into the Act of 1854. They had a power of selling by auction, if they thought fit, in the year 1845, and Mr. Hawksley had said that the amalgamation of the two companies—the old one and the new—which had been made upon structural value represented by shares—had caused some loss of money; that was to say, the computation preceding it had caused some loss of money, and they were anxious to bring into the concern, by the sale of shares by auction, any premium that might be due to the value of those shares in Nottingham. But why was that made compulsory in the year 1854? That was a question he had put to Mr. Hawksley over and over again, and got no sufficient answer. It had been said there were some people who would not trust themselves, and that was apparently the only view reconcilable with Mr. Hawksley's statements—viz., that they voluntarily put themselves under restrictions. But of the practical value of that course there could be no question. The capital value of the shares that had been sold by auction was only £55,000, and upon that amount £13,600 had been netted by premiums. If the 7 per cent. shares were sold by auction, supposing Mr. Hawksley's judgment to be correct, they would produce £77 or £80 for each share instead of £50, which would be £84,000 upon the number of shares sought to be raised, and that sum would go to the construction of works which would be a boon to the community as well as to the company, but if issued without the auction powers, and to the present holders, that sum would go into their pockets. The corporation thought that rather strong. The committee must remember that there were £20,000 of arrears of dividends on the shares at the present moment, and those arrears were to be paid up. At the present rate (according to Mr. Hawksley) there was £10,000, or thereabouts, applicable to the payment of those arrears, so that it would take from 15 to 20 years to pay them off. Then, were these premiums to liquidate the back arrears? On the contrary, those arrears were to be kept running against the public, and when the arrears were paid off the consumers were entitled to a reduction of rates; but the £84,000 was to go to the shareholders as a bonus on the gradual raising of the capital, distributed over the time necessary to construct the works. The view of the case taken by the corporation was a very simple one, founded upon the existing money powers, and directed to the existing sources of supply. The company had unexpended at this moment £69,000, and that sum they obliged themselves to raise—at least, Mr. Hawksley said he would submit to such a clause—before they called up any of the fresh capital. What would that £69,000 do? From £30,000 to £40,000 would sink any well, and provide all connexions with it. Would sinking wells anywhere produce the water? Mr. Hawksley said 1½ million gallons could be obtained from Bestwood Park; but he had been obliged to go to Bullwell because he

was driven out of the park. Instead of letting the water out at one end, he made a hole and let it out at the other, where the coal measures were greater than he had anticipated, and where unluckily he failed; but in Bestwood Park there was an absolute certainty of getting 1½ million gallons of water a day, and he (Mr. Hope Scott) need not say that that would more than supply the present wants of the town. But when they came to inquire into the general character of the district, they found a very large area indeed, which was of the same water-bearing character as that from which at present the best water was taken. Mr. Hull put it at 28 square miles, and said that after deducting all the present wells, and all evaporation, percolation, and loss, the sandstone north of Nottingham would give 6 million gallons a day, exclusive of the present supply, and exclusive of Wilford. They had been told that this was an uncertain stratification, but after all it turned out, upon the geological evidence, that it was not a stratification in which the water was found in fissures, but in which it was found in the whole bed of the stream in the same manner as in a sponge. Upon that question the committee had the evidence of Sir R. Clifton and of Mr. John Brown, which, notwithstanding the denial of the resident engineer, could not well be got over. Mr. Brown was cross-examined, and every effort made to show he had been counting the same water twice over—in the upper strata and again in the lower strata—but his answer was as clear as possible. Then it was said that the water was not so good as that from the Dover Beck. But their own witnesses, Dr. Letheby and Dr. Odling, said they were very good waters, Basford and the park well being superior to Dover Beck in some respects. Then they had the evidence of Dr. Frankland, who did not think Dover Beck so good as Basford, and Dr. Miller concurred with him. They had also evidence of the organic matter found in the Dover Beck. Why, then, should they go there and spend £80,000 or more, when the ground under their feet in Nottingham was abundantly supplied with water which up to that time had been considered good and proper, and which even the witnesses called to give evidence in favour of this bill did not condemn? The case of the corporation, then, was this: the company had money enough to make a new well; they might go to the Wilford colliery, where they would get water in abundance; and by sinking a well they could do what was necessary with the funds they had in hand. They might sell their shares by auction, and apply the extra money, which would be more considerable than if the 7 per cent. shares were issued. They would have their £55,000 or £60,000 of share capital in addition to £24,000 borrowed; let them spend that as the Act of 1854 contemplated—in buying wells and springs in the neighbourhood of Nottingham itself—and when they had done that, if there should be a failure in the supply of Nottingham, then and then only could they come to Parliament and say, "We have given the Nottingham people all in the way you have told us to do; let us have further capital; and, inasmuch as we have been losing money in these experiments, let us have the money at 7 per cent., and let us also have the benefit of recouping ourselves by the extra value of these shares." Such a proposal as that, he (Mr. Hope Scott) could understand; but the present proposal he could not understand, because they were leaving what was pure and good, and easy to be obtained, and clean, and were seeking to raise money which the corporation said was more than was needed if the company adopted the old principle on which the Act of 1854 was founded. In either view of the case he would submit to the committee this consideration: supposing the whole of this matter to be a failure, upon whom would that failure eventually fall? Sooner or later it would fall upon the community. If there were a failure, financially or otherwise, the existing rates were not immoveable. More than one company had got Parliament to augment the rates, and the corporation would be told, "We were obliged to go a great distance for water; we sought to give you a much better water than you had before; we cannot get that interest for our shareholders to which we are entitled; therefore, if you please, we must raise the domestic rate upon you, and you must submit." A still higher aim than that—viz., a pressure in case of a purchase—was, he apprehended, really at the bottom of the scheme, which purchase was to be increased by the 7 per cent. stock which the company sought to put forward, and for which the community must, sooner or later, pay. The people mainly interested were content with the water found in those wells, and the committee could not, upon the evidence, say it was not fit and proper water to be drunk. Some witnesses even said it was better than they desired; but it was to be brought cheaply and gradually to the dwellings of the population, and did not involve an expenditure which for years and years to come might prove to have been absolutely useless to the community at Nottingham.

Wednesday, April 21.

Mr. Digby addressed the committee in support of the petition of the Rev. Joseph Banks Wright and John Tidd Pratt, as lessees in trust and on the part of Sir John Sutton, the beneficial owner of the Hoveringham Mill estate, situate by the Dover Beck. The essential point of opposition was the value of the Dover Beck as a means of irrigation, the watering of cattle, &c.

The Chairman said that such matters were simply questions of compensation.

Mr. Digby complained also of pollution. A lengthened discussion ensued, bearing partly on the question of the preamble of the bill being capable of proof. Mr. Digby disclaimed any intention of vexatious opposition, but, referring to Sir John Sutton, he claimed that, with the corporation, he opposed on public grounds. He stated also that if the committee resolved to pass the preamble, he should insist on other clauses being put in.

In regard to the pumping-station and the Hoveringham estate, Mr. Denison objected to further evidence.

Mr. Digby wished to show that no fresh water would come in between the two that could dilute the sewage.

Mr. Denison objected that such was merely a question of injury.

Mr. Digby had the further evidence of Mr. Maloy and Mr. Thorsby.

Mr. Huskisson, on being mentioned, stated that he was prepared to accept the proposals made by the promoters of the bill, as they were suggested by a liberal spirit. One only would be embodied in the bill, and the rest would be subjects of agreement. He regarded the Dover Beck as a good source of water supply, and he was opposed to the views of the corporation in that respect, entering into particulars. He tendered his thanks to the committee for their patient hearing.

Mr. Denison was then heard. He expressed a hope that Sir John Sutton would take an example of moderation from Mr. Huskisson, whose case, in regard to compensation and injury, was much stronger than Sir John's. The evidence of the Speaker was in favour of Mr. Huskisson and of the corporation; indeed, he had shown himself a violent partisan of that gentleman. In regard to the opposition of the corporation, his learned friend had praised it as a non-litigious body. He (Mr. Denison) had had much acquaintance with the corporation of Nottingham, having been long engaged for the gas and water companies of that town. The corporation had appeared three times against the gas company—viz., in 1853, 1858, and 1864. He was not sure that they had not opposed the water company in 1854. Mr. Hope Scott admitted that in that year they drove the companies into accepting the auction clauses, upon which their present opposition now turns. It was simply owing, in fact, to the opposition of the corporation in 1854 that the companies accepted the auction clause, which they had not intended to do, although they had adopted it in 1846. [The learned gentleman produced the original bill to prove the assertion he made.] Mr. Hope Scott had stated that the money part of the bill was really at the bottom of the whole concern. It was clearly at the bottom of Mr. Scott's opposition. That gentleman stated that Mr. Hawksley was not inexperienced in cases where corporations had bought the works of water and gas companies. Mr. Scott had suggested that the water company had promoted their bill with the object of increasing the price when the corporation wished to purchase the works. He (Mr. Denison) said that there had never been the smallest proposal to purchase the works until the present bill had been brought in, inasmuch as the notices were given only in November, 1868. Had the corporation made repeated previous offers to purchase, there might have been some foundation for the suggestion just referred to. The opposition of the corporation was simply made in order that they might purchase the works on their own terms. They say that no further powers are to be given, because they are ready to purchase, but he considered that they had no intention of the kind. The real bone of contention between the company and the corporation is whether the capital is to be dealt with in the way the latter propose, or according to the wish of the company. Had the latter acceded to the views of the corporation, that body would not have been now in opposition to the bill. Their object was merely to drive the company to consent to their terms about the capital and the sales by auction. In respect to the question of capital, what possible reason could there be that, because the company, in 1854, had volunteered to a particular arrangement with regard to the capital and dividend, they should be forced into that arrangement in all time to come? If such an arrangement in 1854 was a bargain, then it was only so to that particular amount of capital and no more. The company volunteered the concession as fair and proper, because of the comparatively recent conversion of their shares from £25 to £50 each. A similar case had occurred in respect to the Sunderland and South Shields Company in the year 1859. This was an Act of Mr. Hawksley's, and had a similar clause to that of the Nottingham Gas Act of 1854. The corporation of Sunderland and South Shields in 1868 acted in precisely a similar manner to that pursued by the Nottingham one against this bill. The chairman in that case, who had tried many bills of the kind, stated that the committee would not require the new shares to be sold by auction. There had not been one instance in which Parliament had imposed on a company the obligation which the corporation of Nottingham now wanted to enforce; in fact, all instances of the kind are in the opposite direction. If the argument of Mr. Hope Scott prevailed, then it would follow that, because the 5 per cent. shares of the company were at a premium, the company should not have the benefit. It was simply equivalent to saying that, if the shares are not at a premium, let the old company have them; but the moment they are so, then repeal the Companies Clauses Act. If the shareholders are not to have the benefit of the clauses when they turn out a benefit, then the law must be wrong. In 1868, Mr. Cardwell, despite his desire to raise the price and illuminating power, left the gas companies of London to raise their fresh capital at the old amount of 10 per cent.; not even reducing them to 7 per cent., even though there were precedents for that. It was curious that Mr. Hope Scott should have said that, whilst the company were going into an unprofitable scheme, he complained of their taking 7 per cent. if they could get it. If the scheme became profitable, it could only be because water was wanted; if it were unprofitable, then his argument that the company would gain £80,000 would fall to pieces. Mr. Hope Scott had said that, by turning to the borrowing powers unexercised, £69,000 was still left that might be spent. But it was the intention of the old Act that the company should do its work out of its capital, and that the borrowing powers should not be exercised except under unexpected circumstances. That was the only source which the company could rely on in case of emergency, and, if used, could not be renewed till 1871, because the time was passed for giving the requisite parliamentary notices. Hence the prudence of Mr. Hawksley's views of reserving the borrowing powers for extraordinary purposes. That would leave, instead of £69,000, a capital of £45,000 unissued. Such a sum would be utterly inadequate for any substantial extension of the works, and were it not so, the company would never have asked for power to spend £150,000. If they could not expend this profitably they must bear the loss, for an unnecessary expenditure of capital must result in diminution of dividend. The purchase of a company's rights is always based on a calculation of a certain number of years purchase of the present profits of the concern, and not the present dividends per cent. Arbitrators do not care what per cent. a company is getting, but give a certain number of years purchase on the annual earnings, so that if the water company were to spend £150,000 unnecessarily, and were not able to earn 10 per cent., the amount they would get on sale would be so much the greater loss to them. Mr. Hope Scott had said that the idea of entirely departing from the use of the Trent was not a wise one, and also that the population of Nottingham were scrambling for a supply of water. If such were the case, it would be unnecessary for him (Mr. Denison) to go through evidence that had been given on that point. Why were the corporation and town of Nottingham scrambling for water? Simply because they knew that 1 million gallons of their present supply from the Trent and Scotthole ought to be abandoned. If they were then losing that amount, something must be done to replace it. Dr. Letheby, one of the best authorities on the subject, had said the Basford works were the only ones furnishing good water. Now the total present supply of Old and New Basford was but 2 million gallons, for a population whose present consumption is 3½ million gallons, showing a deficit from the present want of 1½ million gallons. He (Mr. Denison) would here remark on the necessity of extending the district. In every case that he had conducted on the part of companies desiring extension, which was opposed by somebody, the extension had invariably been granted. The Sunderland and South Shields district was, for example, enlarged by the addition of 33 parishes added to the former demand for supply. In regard to the extension in the case of Nottingham, at least 24,000 outlying inhabitants had asked for a supply of water, until they were tired. The refusal to give them water was made as long ago as 1865, and had no relation to the dry summer of last year. Now, if 1½ million more were wanted for the present population, what would be wanted for a population such as committees are in the habit of providing for when bills come before them? Mr. Hawksley had stated that in 1871 the population would be 170,000, in 1881 about 204,000; and, 20 years hence, a population of 244,000 would have to be provided for. If, in 12 years to come, the population rose to 200,000, whence was the water supply to come?

Three and a half million gallons are wanted for the present population. But there should always be a margin above the present actual consumption, or, in other words, at least 4 million gallons are required. Even admitting the truth on the part of the opposition, that 2 million gallons per day could be got from certain bore-holes, still that was no reason why the company's bill should be rejected. Mr. Hawksley proposed to divide the works into two classes. For the sum of £80,000 he would be able to provide immediately for seven or eight years, and, when the time came for further extension, £70,000 would be left to afford a further supply of 3½ million gallons. Sir Robert Clifton's evidence had taken him (Mr. Denison) by surprise; but it was plain that the facts were so cunningly devised as to give Mr. Hawksley no data on which, as an engineer, he could place any dependence. Why did not the other side put forward a competent engineer to give accurate evidence on this point, rather than trust it to Sir Robert Clifton, who did not seem to know whether at times he was speaking of yards or feet? Surprises of this kind ought not to be allowed. In this case a competent engineer had stated that, knowing the district, there were no bore-holes he could depend on for a supply; and suddenly he is put aside by a man who states that he has a bore-hole known only to himself. Had this statement been printed in the petition, Mr. Hawksley would have had an opportunity of testing its accuracy. By the evidence of Mr. Brown it appears that 2000 gallons per minute, which he said might be obtained, never had been so. Were these conjectural statements to be set against Mr. Hawksley's knowledge of the district, which was necessarily precarious, because it was sandstone all over? The case was one entirely of supposition in regard to that supply of 2000 gallons. Because Mr. Brown said he had got so many gallons in one place, and so many in another; that sandstone was full of cracks, through which the water permeated; and on that suppository statement the committee had been asked to reject the company's bill. Mr. Hope Scott had suggested that the company should go to Bestwood Park—to the Duke of St. Albans's park—but this would be done with no powers, and with the absolute certainty of an opposition to which the present one was a trifle. Had such a course been pursued, he (Mr. Denison) would have opened the bill by saying that the Duke of St. Albans must yield to the public convenience, and the tables would have been turned. The duke would have then set up Dover Beck; he would have called Mr. Huskisson, and he would have repeated in opposition what he had already done. Dr. Letheby, again, would have given evidence in favour of Dover Beck, against, as he has now done in favour of, the company. Such a course, in fact, would have been suicidal. The object of that suggestion, in fact, was simply that of ensuring the rejection of the bill. Mr. Denison admitted that compensation must be made to Sir Robert Clifton, but did not consider it necessary to address the committee on the subject. He proceeded to remark on the evidence of Dr. Frankland, whom he described as one having a mania in water matters. That gentleman had stated that not one of the waters offered was what he should call good, and that to get good water recourse should be had to the millstone grit, perhaps 40 miles away. But Dr. Miller immediately afterwards remarked that he could not agree with Dr. Frankland's opinion. Comparing such evidence with that of Dr. Letheby, was it possible to doubt whose views should be accepted? Dr. Frankland said none of the waters were pure; Dr. Miller gave a substantial reason for differing from Dr. Frankland, and admitted the comparative purity of the Dover Beck water. Dr. Frankland, in fact, did his friends as much harm as his enemies. In regard to the sandstone water, Mr. Denison considered that it was not worth while to talk about generalities. He compared the chemical characters of the proposed sources, as already given in avidence. He concluded that there was not a shadow of doubt that the sandstone supply, as to quality and quantity, was enormously inferior to that proposed by the company. It was hard, bad for washing and domestic purpose, and ruinous to boilers; the longer it was pumped the harder it would get. Mr. Denison concluded his address by stating that Mr. Hope Scott's opposition resolved itself into the money question, but the case of the opposition failed both on the money and water points of view. The increased demand that would arise would be amply provided for by the company, but by no other schemes, not one of which had been substantiated by any water engineer of eminence. The quality of such other schemes, in respect to hardness of water, showed them greatly inferior to that offered by the company. Whether or not the corporation wished to drive a hard bargain, Mr. Denison urged on the committee that their opposition, on its own merits, was unreasonable; and he trusted that they would not have the power of driving such a bargain, which the rejection of the company's bill for obtaining a good supply of water for the town of Nottingham would place in their hands.

The room was then cleared, and, on the readmission of counsel and parties,

The CHAIRMAN declared that the committee were of opinion that the preamble of the bill had not been proved. In reply to an application for costs, on behalf of Sir John Sutton, the chairman said there was no case for costs.

(*Before Mr.* MONK, *Chairman; Mr.* DAWSON, *Mr.* R. W. DUFF, *and Sir* JOHN GRAY. *Additional Members, without Votes—For the Gas Company, Mr.* CAWLEY; *for the Public, Mr.* LOCKE; *Referee, Sir* J. DUCKWORTH.)

IMPERIAL GAS (RECOMMITTED BILL).

THURSDAY, MAY 6.

Mr. HOPE SCOTT, Q.C., Mr. DENISON, Q.C., and Mr. RICHARDS, Q.C., appeared for the company; Mr. RODWELL, Q.C., and Mr. CRIPPS, for the Metropolitan Board; Mr. COOPER for the parish of St. Pancras; and Mr. GREENWELL for the parish of Marylebone.

On the meeting of the committee, the counsel and parties were directed to withdraw, and on being again called in,

The CHAIRMAN said the Imperial Gas Bill and the South Metropolitan Gas Bill had been recommitted to them with an instruction to consider the expediency of inserting clauses to make the bills consistent with the provisions of the City of London Gas Act, 1868; and certain reports of Sir John Trollope's committee, Mr. Cardwell's committee, and other evidence which had been taken before other committees, had been referred to them. Counsel were, therefore, at liberty to comment upon any portion of the evidence contained in those reports, and, if they pleased, to call witnesses; but the point which he would now suggest to both sides was to consider whether they were willing to accept the clauses which had been placed on the notice paper of the House for Wednesday, the 28th of April, and which, no doubt, counsel had seen, as it might save the time of the committee, as well as the time of counsel, if they could agree to those clauses, or let the committee know to which of them they objected.

Mr. HOPE SCOTT said he should be very happy indeed, on behalf of the Imperial Gas Company, whom he represented on this occasion, to give an answer that would expedite the business; but the committee would perfectly understand the difficulty in which he was placed when he stated to them that he did not know whether those clauses referred to by the honourable chairman were all that were likely to be proposed. It seemed to him, especially after the careful examination which the question received by the committee before the recommittal, that it would be very unfair for them to deal with those new suggestions in any other than a collective form, therefore it was impossible for them to deal with those clauses which were upon the notice paper alone, without knowing at the same time whether it was proposed to alter them by any other clauses. He was not, therefore, in a position to be able to answer the committee at that moment.

The CHAIRMAN: You are perfectly aware of the clauses?

Mr. HOPE SCOTT said that he was, and he knew also that there were three petitions on the table against the bill as recommitted, praying for other clauses. He would just refer the chairman to those petitions, which might be new to him. The first was that of the Metropolitan Board of Works, clause 5 of which stated: "That your petitioners desire, on behalf of the inhabitants of that part of the metropolis which is lighted by the Imperial Gas Company, that the company should be placed under more stringent provisions than they are at present, with a view to securing the proper illuminating power and purity of the gas supplied by the company, the reduction of the price of such gas, a more efficient audit of accounts, and a limitation as to dividends and any arrears thereof, and a reserve-fund. And your petitioners therefore desire to urge before the committee the expediency of the company being subject to similar provisions and enactments to those contained in the said Act of 1868." This was going considerably beyond what was put in the notice paper of the House. The next petition was that of the vestry of St. Pancras, clause 5 of which stated: "Your petitioners desire that due provision should be made by Parliament for securing the proper illuminating power and purity of the gas supplied by the said company, a reasonable price for such supply, and providing a proper control over the transactions of the company, a limitation of their dividends and of their claims for arrears, and an efficient audit of their accounts; and your petitioners are prepared to show that this control ought to be reposed in your petitioners, as far as their parish is concerned."

The CHAIRMAN: The instruction is: "That the committee should consider the expediency of inserting clauses to make the bill consistent with the provisions in the City of London Gas Act, 1868." That has a very wide range.

Mr. HOPE SCOTT said it was on that part of the instructions that the petitioners evidently were endeavouring to take advantage. The third petition was from the vestry of Marylebone, and was to the same effect. Clause 3 was: "That your petitioners desire to be heard, if necessary, before the said committee, with reference to any provisions which the committee may have under discussion, and in support of all necessary powers being conferred upon your petitioners, as the governing body of the parish, for securing to the inhabitants a supply of gas of proper illuminating power and purity, and at a reasonable price." The committee would see that he was not wrong in stating that a comparatively small part of what was now wanted was covered by the notice paper, and that far more extensive questions were sought to be raised by the petitioners; it was opening, in fact, the whole question, which the committee had (as was considered) settled upon the preamble. His friend, Mr. Burke, reminded him that there were petitions against the bill which raised all those points, and upon which their decision upon the preamble was arrived at, and therefore it seemed hard that all these should be sprung again upon them.

Mr. RODWELL said on behalf of his clients, the Metropolitan Board of Works, all they wished to do, as they stated at first, was to assimilate the bill to the conditions of the City of London Gas Act, 1868. They did not want to get one inch further than that. He considered them model clauses and distinct legislation on the subject, and they had prepared clauses carrying out those views, which were in principle and substance the same as those in the City of London Gas Act, and, *mutatis mutandis*, it would be reading "the Metropolitan Board of Works" for "the Corporation of London." They did not want to make further alteration. He had got the clauses in his hand; but, of course, he did not wish to oppose any suggestion of his friend, to the effect that he should have more time for consideration. Their own course was perfectly clear, and he would leave the committee to deal with his friend's proposition as they thought proper.

Mr. COOPER said, with reference to the vestry of St. Pancras, he begged leave to state they did not withdraw on the preamble. They went for a clause, and they got it; but they were stopped by the Metropolitan Board of Works, in the House of Lords, against the proposition that the Metropolitan Board should appoint the examiner of gas.

The CHAIRMAN asked if they proposed to take those powers for the Metropolitan Board of Works, in reference to this company, which the corporation had in reference to the City Gas Act?

Mr. COOPER said they objected to that, and they also objected very strongly to the want of power in the City of London Gas Act to inflict any fine for non-production of gas of its proper purity. There was no penalty in the City of London Gas Act, and they might have it as impure as they pleased, and there was none in these clauses. He thought if the Metropolitan Board of Works had been at all attentive to the interests of the public, they would have proposed something by which, when the gas was not of its proper purity, there should have been some penalty.

The CHAIRMAN: You propose new clauses?

Mr. COOPER said they opposed the clauses which gave the Metropolitan Board power to appoint a tester of gas. At present they appointed their own tester, who did it well, and they did not wish to hand over to the Metropolitan Board of Works that with which they had nothing to do, and they wanted a clause inflicting a penalty if the gas was not of its proper purity.

Mr. GREENWELL said he appeared for the Marylebone Vestry. Upon the last occasion he stated that an agreement had been made between the company and the vestry with reference to the price and illuminating power of the gas. No provision was made with reference to the dividends upon the new capital, and upon that the committee reduced the dividends from 10 per cent. upon the new capital to 7 per cent. He then said he had nothing further to observe upon the subject, but his objection now was to those clauses which had been proposed since the bill was before the committee. His objection was not so much to the bill of the company as to the new clauses; at any rate, his objection was with reference to any clause which took away from the vestry the privilege they now had with reference to testing the gas. The parishes of St. Marylebone and St. Pancras were enormous districts, supplied principally by the Imperial Company at very large rentals, and they considered that the consumers in those districts were the persons who ought to be satisfied with reference to the testing of the gas, and they would be best satisfied if that were done by an officer appointed by the representative body in their respective districts. It had always been done by the vestry, and he hoped they might be allowed to urge that that practice should be continued, and ought not to be transferred to a foreign

body. Of course, if the gas could be supplied at a cheaper rate and with a higher illuminating power, they would be glad to have it, but they did not appear on that account.

Mr. RODWELL would not have spoken before Mr. Hope Scott replied, but he wished to put Mr. Cooper right when he stated there was no penalty if gas was not supplied of proper purity. He found there the following:—"If on any day the gas supplied by the company, from any station, is of less purity than it ought to be under this Act, the company shall forfeit a sum of £50 for each station in respect of which they are so in default." Was not that sufficient? With reference to the question as to who should appoint the tester, it seemed that the vestries claimed the right to do that themselves; but it would be for the committee to determine whether it was not more reasonable, and better for the public generally, that one responsible officer should be appointed, independently of the vestries, who should examine all the various gas-works, instead of having one for each separate district. The matter must be argued hereafter, but that was the point at issue, as he understood.

Mr. HOPE SCOTT thought that this discussion over the dead body of the company seemed rather premature. The question, in the first instance, was whether they were to be slain. He might mention that their bill made no change in the General Act, which enabled the parishes to test the illuminating power. The question of purity would go to the referee, it being pretty well ascertained that that was a question of a very different nature, requiring a vast amount of chemical evidence. His learned friend, Mr. Rodwell, claimed credit for moderation, in not going one step beyond the City Gas Act, and he had been good enough to tell them that the clauses of that Act were model clauses. He (Mr. Hope Scott) differed from him, and was quite ready to take issue upon the question as to whether his bill or the City Bill was the more favourable to the public. They had not yet arrived at the stage of knowing what they had got to discuss; and inasmuch as the order of recommittal gave the committee an ample discretion as to what subject matters they would go into, he would propose that the clauses on the notice paper, and also the clauses proposed on the other side by Mr. Rodwell, or the clauses proposed by any other gentleman, should be laid before the committee. The committee would then ascertain the range of subjects contained in those general clauses. He would know then within what ring to fight. At the same time, it would be a great advantage not only to the committee, but to the different parties before them, because they should then be able to go to the point at once.

The CHAIRMAN: Are you, Mr. Rodwell, prepared to place these clauses before the committee?

Mr. RODWELL: I propose to hand in the clauses, and contrast them with the clauses in the City Gas Act.

Mr. HOPE SCOTT: I propose that the clauses be placed before the committee in order that the committee may see the range to which they extend.

The CHAIRMAN said the committee felt themselves to be in somewhat an anomalous position. Two members had been added as consulting or advising members, and he was not quite able to say whether Mr. Rodwell's proposal would limit the course which it might be the duty of the committee to take.

Mr. HOPE SCOTT said it was the fact of there being an addition to the committee that made him think the laying before them all the different clauses would enable them, with closed doors, to ascertain upon what subject they might require information. He thought that, with internal assistance, the committee might dispense with counsel, and take a general view of the whole question, and intimate what portion of it they would consider.

Mr. RODWELL said, as the principle had already been discussed to a certain extent, the simplest way would be to go through the clauses, and see how they corresponded with the City Gas Act clauses, and what objections his friend would urge to them.

Mr. HOPE SCOTT: I will take them as corresponding.

Mr. RODWELL: It is not for me to tell the committee, but I maintain that the principle has been discussed and settled. Might I, without asking the committee to attach any undue importance to it, call attention to one of the paragraphs in the report of the committee of 1868? "In conclusion, therefore, your committee have now to report the expression of their decided opinion that, either by way of regulation or by the way of an independent supply, the consumer is entitled to a far more efficient control than he at present enjoys with respect to the supply of gas to the metropolis. The difficulty with which your committee have had to contend will be found to apply to every general bill which may be introduced, without the concurrence of the companies, for the regulation of their present monopoly; but it will always be in the power of Parliament to prescribe terms of regulation as such company comes before it to apply for new powers, and the necessity for new powers has usually brought the company to Parliament at no long intervals of time. Your committee, however, do not think it would be just to the consumer to leave him to the casualties of this mode of remedy, and recommend, if the companies decline to submit to general regulations such as Parliament consider reasonable, measures should be taken for the introduction of a new supply in independent hands." As the Imperial Company had now come to Parliament, he proposed to apply those general regulations to them, and the onus on his learned friend was to show that those general regulations were not applicable to that company.

The COMMITTEE: Is that a report upon a bill which is applicable to all cases? Is there any bill which carries out the report?

Mr. RODWELL: No; the committee wanted a bill to apply some general regulations to.

The COMMITTEE: A sort of gas clauses bill?

Mr. RODWELL: Yes; but afterwards the three City companies came, and they were in a similar position to the Imperial Gas Company, and when they came these regulations were applied.

After some conversation,

Mr. HOPE SCOTT called the committee's attention to the fact that none of the petitions were directed against the preamble of the bill, so there was nothing to prevent them from re-affirming the preamble of the bill before going to clauses.

The CHAIRMAN said the committee were of opinion that the preamble of the bill had not been referred to them for reconsideration, and they left it, therefore, to the House to recommit the preamble for any alteration that might be necessary.

Clauses 1, 2, and 3 were read and passed.

Clause 4 was postponed.

Clauses 5 to 18 were read and passed.

Mr. RODWELL said clause 17 was a very important one, and involved several matters which were dealt with hereafter *seriatim* in their printed clauses. The learned counsel read it as follows:—"And whereas, under the provisions of the public Act called 'The Gas-Works Clauses Act, 1847,' as incorporated with the recited Act of 1854, and adopted in 'The Metropolis Gas Act, 1860,' the company are compellable to reduce their charge of gas to the public after the attainment of their authorized dividend, and the creation of a reserve-fund for the maintenance of the same, but objections have been raised as to the mode of enforcing such reduction, for remedy whereof be it enacted." He would stop there to say that they proposed to adopt a system which was introduced in that City Gas Act, which did away with the reserve-fund altogether. By the Metropolis Gas Act of 1860, which also incorporated the Act of 1847, the Imperial Gas Company, if this clause passed, could make the earnings of six years go towards making up any deficiency in dividend during that time, so as to make up the 10 per cent. Under the City Gas Act that power of having a reserve-fund was done away with entirely, and each year stood by itself; but during the discussion which took place upon that question in committee, it was pleaded by the gas companies——

Mr. HOPE SCOTT: I think it is enough to know that you object to this clause being passed, and I will call my witnesses in support of the clause as it stands.

Mr. RODWELL wished to state his objection to this clause, and would read the one he proposed to substitute. Under the City Gas Act a clause called the insurance clause was introduced, and that was done in consequence of a plea put forward by the gas companies, that they were liable to certain accidents and emergencies, which were beyond their control—he thought the illustration given at the time was the explosion at Leicester Square—and the committee took that view of it; they said they would not deprive the companies of a certain amount of their profits to be put aside to meet such emergencies, but they would not allow them to have a reserve-fund. He would now explain to them what he proposed to substitute was, in fact, *ipsissimis verbis* with the City of London Gas Act: "If the clear profit of the undertaking of the company in any year amount to a larger sum than is sufficient to make the dividend to which the respective capitals of the company are by this Act and the existing Acts of the company entitled, the excess beyond the sum necessary for such purposes shall from time to time, to the extent of one pound per centum per annum upon the paid-up capital of the company, be invested in Government or other securities; and the dividends and interest arising from such securities shall also be invested in the same or like securities, in order that the same may accumulate at compound interest, until the fund so formed amounts to a sum equal to one-twentieth of the paid-up capital of the company, which sum shall form an insurance-fund to meet any extraordinary claim or demand which may at any time arise against the company from accident which due prudence and management could not have prevented; and, if such fund be at any time reduced, it may thereafter be again made up to the said sum, so from time to time, as often as such reduction shall happen. Provided that when and so often as the said fund shall reach one-twentieth part of the paid-up capital of the company, the interest thereon shall be carried to the credit of the fund available for dividend." That was a clause precisely the same as clause 26 of the City Gas Act, with this exception (and he stated that these clauses were adapted to their particular case), that 10 per cent. was taken as the existing dividend which the companies were entitled to earn, and here it was placed at the prescribed rate of interest by law allowed; the principle was entirely the same.

Mr. HOPE SCOTT: If I understand rightly, my learned friend wishes to raise upon the 17th clause of our Act, which is not directed to that subject, the question whether we are to have a reserve-fund or not?

Mr. RODWELL: Yes; this clause deals with the reserve-fund distinctly—it recites it.

Mr. HOPE SCOTT: Then I will call my evidence in support of the clause as it now stands.

James St. George Burke, Esq., Q.C., examined by Mr. HOPE SCOTT.

The clause which is before the committee, and objected to by Mr. Rodwell, is a clause to enable the Board of Trade to appoint commissioners in order to ascertain when a reduction in the rates ought properly to be made. It proceeds upon the assumption that we are entitled to a reserve-fund beyond the authorized dividend, and that is the law at this moment. That clause was very much discussed at the board of directors of the Imperial Gas Company before it was adopted. The existing law allows the Court of Quarter Sessions to investigate the affairs of the company, and if they are making more than 10 per cent., and have laid by more than a sufficient sum, as authorized by Parliament, to maintain that 10 per cent., the Court of Quarter Sessions has the right to compel a reduction of charge. Many persons complained that that was an awkward way of arriving at the result desired, and therefore this clause was prepared after due consideration. [Witness then proceeded to quote the clause, which was to the effect that on complaint to the President of the Board of Trade by the Metropolitan Board of Works that the revenue of the company, at the price charged by them, is in excess of what is needed to maintain, with due care and management, the dividends, the president may appoint three competent persons to investigate the affairs of the company relating to gas manufacture, and in the event of their report being unfavourable to the company, it shall be in the power of the Board of Trade to direct that the charges for gas, from a certain date, to be fixed by him, shall be reduced.] That clause was prepared under the notion that it was almost impossible to divine anything fairer to the public, because it enables us to maintain what the law has given us, and nothing more. We object most strongly to any alteration in reference to any of our existing privileges, under which the whole of our capital has been subscribed, and under which we are enabled, by means of a reserve-fund, to maintain our dividend. I stated on the last occasion that it was a gross mistake to assume that that reserve-fund is altogether a benefit to the companies. The Imperial Gas Company have laid by a certain reserve-fund—not nearly so much as they are authorized to lay by, by Parliament—but they have laid by enough to enable them to reduce their charge to the public to the extent of £50,000 per annum. The amount of the reserve-fund is nearly £50,000 in hand. What has been the result? The public have had the benefit of £50,000 a year reduction in our charge, because we knew, in making the reduction, we had a reserve-fund by which to recoup ourselves our possible losses. The real truth is that, since we have made that reduction, we have never yet, out of our actual revenue, realized enough to pay our authorized dividend, but we have made it up out of this reserve-fund. In truth, the public have been gainers by that great reduction on our part, which we never should have made had it not been that we were fortified by the reserve-fund, by which we are enabled to maintain our dividend.

The COMMITTEE: At the same time you are charging 4s. per 1000 feet to the public?

Witness: Yes; but we have never made our dividends out of it. Last year we were £6000 short of our dividend.

Mr. HOPE SCOTT: Reference has been made to the City Gas Act. I will ask you whether the companies who came under that Act had any existing reserve-fund?

Witness: No, I believe not. The advantage of a reserve-fund is, that it enables the company to make ventures in the reduction of price in favour of the public. Our last reduction dates from June, 1865. Since then we have

never got, out of our reduced price, our dividend, without applying to the reserve-fund?

Mr. HOPE SCOTT: Probably you are finding a gradual increase upon your reduced price.

Witness: Yes. No doubt as the supply of gas increases we shall be enabled to reduce our price. We have done so for years past. When I first joined the company the price of gas was 9s., and now it is 4s. by our voluntary reductions from time to time, in consequence of the increase of business.

Mr. HOPE SCOTT: When the extended consumption gives you the dividend, the reserve-fund will stand over for another similar reduction hereafter?

Witness: Yes. It is for the public advantage as much as our own, except that it enables us, under the law under which the capital was subscribed, to maintain our dividend of 10 per cent. Those were the terms upon which our capital was subscribed. Parliament said, when it authorized us to double our capital in 1854, "You may double that capital subject to certain conditions;" one of them being that we should never divide more than 10 per cent., with a proviso that we might lay by sufficient to maintain that dividend. The capital is now held by the public upon those terms, and if the reserve-fund is taken away the value of the capital invested will be deteriorated enormously.

Mr. HOPE SCOTT: Supposing you did reduce and you had a loss, you would have to raise your prices again very suddenly, as soon as you found out that you were working at a loss?

Witness: Yes; and that will be the working of the City Gas Act, which they set up as a model gas Act.

Mr. HOPE SCOTT: In other words, there would be a constant fluctuation of price?

Witness: Yes; and they may go far beyond the limits which we have imposed upon ourselves; and inasmuch as the Chartered Company, under the existing law, are paying only 4½ per cent., the probability is that the commissioners appointed must raise them to 4s. 6d., whereas we say we can never charge more than 4s. I will undertake to say, if anybody examines it correctly, our Act is far more beneficial than the City Act, because under the City Act they are entitled to take 10 per cent. upon all new capital, and raise the charge to such a sum as will enable them at all times to make that 10 per cent., whereas, under our bill, we get only 7 per cent. upon new capital, and can never charge more than 4s. up to 1871, and after that 3s. 9d., according to the decision of the committee. Our right to a reserve-fund has existed since 1854; but when it was commenced I can hardly tell you. Up to 1854 we had no limitation as to price or dividend. I cannot give you the largest amount we have ever had in that fund. We have had a considerable sum, but for the last three years we have been taking from it. If there had been no reserve-fund, and we had been compelled to reduce the price of gas after our dividends reached 10 per cent. we should have done so, but we could never have done it to the same extent. I say that, with our reserve-fund and the limitation of price, is far better for the public than the provisions of the City Act.

Cross-examined by Mr. RODWELL: I do not say that it is better for the public that we should have a reserve-fund, but that it is a fallacy to suppose it is exclusively for the benefit of the company. If the company are entitled to divide 10 per cent., and they cannot divide more, then I maintain that the reserve-fund is no benefit to them further than maintaining their dividend, they being entitled to obtain from the public such a price as will maintain their dividend.

Mr. RODWELL: Do you not think that the power to have a reserve-fund leads to want of due management in the concerns of the company?

Witness: No one has ever attempted to show that there has been a want of due care and management in the company I represent.

Mr. RODWELL: When the Chartered Company came last year to Parliament, they had the same right as you have with regard to the reserve-fund?

Witness: Yes; and they were in such a state of poverty that when Mr. Cardwell said, "If you do not submit to my terms, I will pass a corporation bill under which you will be ruined"——

Mr. RODWELL: I do not think he said that.

Witness: Yes: "If you do not submit to my terms, I will pass a bill by which you will be ruined," establishing a competition in the hands of the corporation. They said—and I have the statement in my hands—"You are proposing to us that which will probably end in our ruin." To put it in another form, "We are in such a condition financially that we will take your terms *coûte que coûte*."

Mr. RODWELL: That does not apply to you?

Witness: No; we would rather withdraw the bill than have such terms imposed upon us. We could not face our shareholders if you imposed such terms upon us, which would practically reduce our dividends one-half.

Mr. RODWELL: My question is, whether we are not asking the committee to deal with you in the same manner as the committee dealt with the Chartered Company in 1868?

Witness: My answer is, if the committee did so, they would take away from our existing shareholders those rights which they now enjoy under parliamentary sanction, by which 10 per cent. is obtained. In effect it would be a confiscation of property.

Mr. RODWELL: Do you think there is a liability to much fluctuation if the price is fixed at 3s. 9d.? You take credit for having lowered your prices in favour of the public; do you think it is likely they will be lowered beyond 3s. 9d.?

Witness: In the course of years they may. I can tell you that the operation of the law has been such that our prices have been gradually lowered down to 4s., and had we not been persecuted as we have been for the last four or five years, entailing enormous expenses, I believe the price might have been lower at this moment; and the committee having reduced our price to 3s. 9d. hereafter, we have considered whether we could make that reduction and still maintain our dividend. Our hope is that, by means of the reserve-fund, we may do it.

Mr. RODWELL: You recollect it being stated that the great object of the reserve-fund was to guard against any sudden emergency—explosion, for instance, or things of that sort.

Witness: If you read the Act of 1847, which is applicable to all gas companies in the kingdom, you will find that it states distinctly that that reserve-fund is applicable not only to that, but to the maintenance of the companies dividends. That is the law applicable to all England, and why it should differ in London I do not know. That Act was passed to my knowledge after full consideration by a committee in Parliament, who investigated the subject, and held that it was a fair provision.

By Mr. COOPER: Our reserve-fund is limited in its extent by the Act of 1854. The public would have the full advantage afterwards of any reduction in the price.

By the COMMITTEE: It is limited to 10 per cent. upon the capital.

Re-examined by Mr. HOPE SCOTT: The clauses with reference to limitation and with regard to the reserve-fund are the two clauses which have reference to it in the Act of 1847. That is the only general legislation which has ever passed upon this subject, and in 1866 Sir J. Trollope's committee, who investigated this subject at great length with a committee of 15, by no means concurred with the views of Mr. Cardwell, and maintained the reserve-fund; but they said it would be expedient to reduce the term to three years during which back dividends might be paid. In 1860 the back dividends were limited to six years, on account of our having the monopoly, as it was said, of the supply of London. It was said: "You must come under some different obligations from other companies in the kingdom;" whereas other companies might recoup their dividends for an unlimited period. Supposing we reached our 10 per cent. dividend, and found we had a surplus, and we were to make a reduction in the price, that would be a benefit to the public to the extent of that reduction; but suppose the surplus to be a small sum of £5000 or £6000, could there be made an appreciable reduction in the price of gas?

Mr. HOPE SCOTT: The practical effect upon the consumers seems to be this, that you merely delay for a time the obligation of reduction by providing a fund which, in the nature of a reserve, equalizes your prices charged to your constituents.

Witness: There can be no doubt that it is done for the protection of the shareholders, as well as for the advantage of the public, but it is done by the sanction of Parliament. Mr. Cardwell himself said, in that committee, last year: "I cannot, with justice, repeal the terms upon which your money has been subscribed; but unless you voluntarily consent to my conditions, I shall suggest a mode by which you may be ruined." That is his report.

Mr. HOPE SCOTT: I believe you with myself concurred in telling the companies that if they would only stand by they need not be afraid of the consequence?

Witness: I have practised long in Parliament, and had vast experience in these matters, and I have throughout said: "If you will only fight it out, depend upon it neither the House of Commons nor the House of Lords will sanction such a principle, which, in effect, was investing a corporation with the power of competing with private companies."

By the COMMITTEE: There is no clause in this bill to prevent our applying a portion of the reserve-fund towards paying back dividends for the last six years. We remain under the Metropolis Act of 1860.

Mr. RODWELL: By striking out this portion of clause 17, which recites the Act of 1847 and the Metropolis Gas Act, 1860, we deprive them of the right to their reserve-fund. We propose to do that, and leave them with the insurance-fund.

The COMMITTEE: You mean to substitute the insurance-fund for the reserve-fund?

Mr. RODWELL: Yes, it comes to that.

The CHAIRMAN: What is the meaning of the last words in that clause—"The interest thereof shall be carried to the credit of the fund available for dividend"? Would that be available to make up the dividend in any back year? That is clause 26 in the City of London Gas Act.

Mr. RODWELL: That is, if anything be over in the course of one year it will come into the dividends for the next year, and so on. It does not mean to set it aside as a reserve-fund, but it means that it is to be part of the assets of the company, to go towards paying the dividends for the next year.

The COMMITTEE: I should like you to explain to what single case you can suggest this insurance-fund would ever be applicable.

Mr. RODWELL: The case before the committee was the Leicester Square explosion, which arose from an accident quite unaccounted for, and the Wood Street fire.

The COMMITTEE: That would not have been met by the insurance-fund. The words were, "From accidents when due prudence and management could not have prevented." It is perfectly plain that due prudence and management would have prevented either the one or the other of those accidents, certainly the Wood Street fire, because that was found to be negligence.

Mr. RODWELL: Supposing there were any riots—supposing the gas-works were blown up, or anything of that sort. Those are all things which it is impossible to say might not happen.

Mr. HOPE SCOTT (to witness): The clause suggested by my learned friend is to the effect that there should be a fund which is to supersede your reserve-fund, but there is no clause, as I understand it, in the City Gas Act which deals with the existing reserve-fund.

Witness: No.

Mr. HOPE SCOTT: In the first place, this new fund which my learned friend suggests is a fund which is to be one-twentieth part of the paid-up capital of the company, and when that reaches a twentieth part of the paid-up capital of the company, the company would have no power to draw upon that fund except for the purpose of accident as described in the clause. And the interest upon that would be treated as if it were gas-rental, and would be carried to the credit of the company as such, and carried to the credit of the gas consumer as such?

Witness: Yes.

Mr. HOPE SCOTT: So that he would get all the benefit in the way of annual income, while your shareholders would be deprived of the reserve-fund, which is their guarantee?

Witness: Yes.

Mr. HOPE SCOTT: What is your opinion as to the effect on the value of your shares by the introduction of that clause?

Witness: It is obvious. In the first place, it was one of the main grounds of our withdrawing from Mr. Cardwell's committee at once. We said: "We cannot accept a bill which will deteriorate the value of our shares, and materially affect the position of our shareholders." At present our capital of 1½ million is subscribed upon these conditions—that we may have a reserve-fund to maintain that 10 per cent.; and the condition imposed by Mr. Cardwell is this: "You may have a reserve-fund against accidents, fires, and so on; but I will not allow you to apply any of that to the maintenance of your dividend." The consequence is, if a company makes anything above 10 per cent., the commissioners are to determine at once what reduction shall take place to bring it as near as may be, but never to exceed, 10 per cent. So the effect would be this: the company next year making 9 per cent., according to the price they would charge, would have no means of recouping it; and that which Parliament has declared was to be a 10 per cent. dividend, would become an 8 or 9 per cent. dividend. The public would feel that, and now that they know an attempt is being made to introduce these City provisions, the effect has been that our shares have fallen 30 per cent.

The CHAIRMAN: The committee have cut down the dividend to 7 per cent. in reference to new capital?

Witness: That is capital where the public has the choice of taking it or not. A large proportion of our capital is held by parties—partly, I confess, under my own recommendation—who bought their shares at from £80 to

£90 a share, under a firm belief that the Act of Parliament created a contract between the parties which would not be loosely violated by Parliament.

The COMMITTEE: Would not a less reserve-fund suit your purpose?

Witness: I do not attach so much importance to that. We have never waited till we have laid by so large a sum before making a reduction; but I do require such a fair sum as will enable me to ensure a dividend of 10 per cent. The amount required to pay our dividend is £140,000. Under this clause we might have a reserve-fund of £130,000. We have taken from our reserve-fund for the last few years something like £50,000.

Mr. RODWELL: What is the largest sum you have had applicable to the reserve-fund in one year?

Witness: £85,000.

The COMMITTEE: If the bill passes you may accumulate a reserve-fund of £230,000?

Witness: It will be 10 per cent. upon the total capital. We have no interest in making that reserve-fund, we believe ourselves; and I wish it to be understood that our greatest security is to sell gas as cheaply as we can, and to supply it as good as we can, and we have adopted that principle over twenty years.

The COMMITTEE: Does the interest of the reserve-fund go on accumulating?

Witness: Yes; it adds to itself.

Mr. RODWELL: What is the average price of all the gas sold by the Imperial Company in the year?

Witness: I cannot give you that. The lowest charge was 3s. 3d.

FRIDAY, MAY 7.

Mr. RODWELL said he proposed to call evidence in answer to what Mr. Burke stated on the previous day. Before doing that he would, with the permission of the committee, refer to two or three passages in the evidence given on previous inquiries, to show what was the object of the reserve-fund. [The learned counsel quoted from Mr. Robert Baxter's evidence, in 1866, to the effect that the reserve-fund was for the purpose of making up the dividend to the prescribed rate, and for meeting the expenses of extraordinary contingencies; that the last-named application could only be made on the order of two justices; and that no part of the fund was applicable to capital expenditure.] He also proposed to direct attention to the report of the select committee in 1867, with reference to the construction put by the companies on the combined operation of the Acts of 1847 and 1860 as to making up the deficiency in back dividends out of the surplus profits in future years.

The CHAIRMAN: The reserve-fund has never nearly approached one-tenth of the capital.

Mr. RICHARDS said it was as near as 84 to 130.

Mr. RODWELL said he found, by the evidence already given, that not only had the company a reserve-fund of £85,782, but, under their special Act of 1854, they had a contingency-fund amounting to £43,561; so that, in round numbers, their reserve amounted to £130,000. The difference between the two was that the latter was taken out of the profits before 10 per cent. was divisible, and the former was taken afterwards—a very material difference, because one came out of the shareholders pockets, the other out of the pockets of the consumers.

The CHAIRMAN: That clause is in no way affected by the bill before us.

Mr. RODWELL said it was not, and therefore if the bill passed the company would have the reserve-fund under the General Act, and the contingency-fund under their special Act. If the principle of the City Act was adopted, instead of these funds they would have the insurance-fund, to which he had already directed attention.

Mr. RICHARDS said in the cross-examination of Mr. Burke his learned friend did not touch upon the question of the contingent-fund in any way, and he could not help thinking it would be more reasonable that Mr. Burke should be permitted to explain the exact circumstances.

Jas. St. George Burke, Esq., recalled, and examined by the CHAIRMAN.

I was asked yesterday, by an honourable member of the committee, what was the maximum amount of our reserve-fund. I appealed to the accountant, who informed me it was £85,000, which was the fact; but afterwards, on reconsidering the question, it occurred to me that probably the honourable member desired to know not only the amount applicable to make up the dividend, but also the amount applicable to make up the contingency-fund, and I come this morning prepared to explain that the £85,000 referred to the reserve-fund; but, under our Act of Incorporation of 1854, an obligation was imposed upon the company, in the interest of the shareholders, that £3000 a year should always be laid by as applicable to contingencies, and that fund exists at this moment in addition to the reserve-fund.

Mr. RODWELL: For what contingencies was this amount of £6000 expended?

Witness: I think law costs.

Mr. DAWSON: To what does the contingency-fund amount?

Witness: In round numbers, about £38,000. It has been accumulating for years past. It is not a discretion on our part, but we are compelled by Act of Parliament to put by £3000 a year to that fund.

Mr. DAWSON: The dividend was made up out of the reserve-fund, and not out of the contingency-fund?

Witness: Yes; whenever we have come to Parliament for bills, we have charged the expenses out of our own capital or revenue; but when we have been attacked——

Mr. RODWELL: My question was a very simple one, and put in a cool and distinct manner. I asked you upon what contingencies was that sum of £6000 spent, and you told me that it was spent in reference to some law costs.

Witness: I could not give you that answer broadly, without telling you that I draw a distinction between law costs occasioned by ourselves, and law costs which we have been compelled to incur by reason of our being attacked by persons really not interested in the question. We have had for three or four years to encounter costs of this kind, and they come under the description given in our contingency-fund of "Unfounded expenses," because we could not have foreseen them.

Mr. LOCKE: Do you consider this an attack now?

Witness: No; this is clearly our own bill.

George Wilson Stevenson, Esq., examined by Mr. RODWELL.

I am a gas engineer, and have been concerned for many years in the study of matters connected with gas, and have taken a very prominent part as witness in the various inquiries before committees on these matters, especially concerning the metropolitan gas. I am aware of the provisions of these various Acts, both public and private. I am aware of the effect of the General Act of 1847, and of the clause which is introduced into the City Gas Act—the insurance clause. I am also aware that it is proposed by the Metropolitan Board of Works to introduce a clause into this Act similar to the latter.

Mr. RODWELL: It has been suggested by Mr. Burke that this reserve-fund is practically a security to the consumer. Can you see it in that light?

Witness: I do not think it is any security to the consumer, though I think it is a very great security to the shareholders of the company.

Mr. RODWELL: Will you explain why you have arrived at a conclusion different from that at which Mr. Burke has arrived?

Witness: I think the consumers of gas for the current year ought to have the gas supplied at the current rate of cost of production; and the reserve-fund in the Act of 1847 does not contemplate such a thing, because, in the first instance, a reserve-fund has to be created, and that can only be done by there being a surplus profit beyond the prescribed dividend of 10 per cent., or whatever special rate there may be in the special list, and this surplus goes on accumulating until it reaches the amount of one-tenth of the nominal capital of the company. In this case it would be £230,000. The consumers of gas, out of whose pockets this fund has been accumulated, are made to suffer for the sake of the shareholders, who may, if they please, reduce the price of gas improperly in subsequent years, or may happen to fail in making the usual profits, in which cases they would come upon this reserve-fund, and supplement their deficient dividend; and I say that is wrong; but if there were no reserve-fund the reduction must go direct to the consumer. A reserve-fund secures an equalization of dividend over a course of years to the company, but it does not help the consumer one bit. I think it is commercially immoral.

Mr. RODWELL: Immoral?

Witness: I think it is contrary to the principles of commercial morality for a tradesman (and the company must in this respect be considered as a tradesman) to get out of the pockets of his customers in one year that which will recoup himself for some deficiency in the course of some three, four, five, or six years hence.

Examination continued: I think that there is not sufficient inducement to economize when a company know that they have a reserve-fund upon which they can draw to supplement deficient dividends, and that the reserve-fund would thus interfere with due management and care on the part of the company. I do not think it would be at all unfair to impose this clause on this company. I do not think it would press more heavily on this company than it does on the Chartered. I think there ought to be a reserve-fund for contingencies such as may possibly arise.

By the CHAIRMAN: I consider that the contingency-fund should be more than £3000 a year. It ought to be assimilated to the provision in the City of London Gas Act, which is 1 per cent. per annum upon the paid-up capital until it reaches 5 per cent., and this forms an insurance-fund against contingencies.

Mr. RODWELL: Can you state what class of events you would put under the head of contingencies?

Witness: There any many things which might happen to entitle the company to draw upon this fund. I should consider the accident at Nine Elms, when the gasholder was blown up, a proper case, as it was occasioned by some workmen brought upon the company's premises, but who were not the company's servants. I think that was clearly a case of accident.

Mr. RODWELL: Mr. Burke stated yesterday that the Chartered Company only paid 4¼ per cent. dividend, and it was suggested by my friend, Mr. Denison, that that was attributable to the legislation of 1868. Can that be so?

Witness: I do not think so. On the contrary, the chairman of the company distinctly states that it is not so, but that it is attributable to exceptional circumstances.

Mr. RODWELL: Will you state to what you refer?

Witness: I have before me the report of the Chartered Gas Company's directors, and the chairman in his speech says——

Mr. DENISON: I do not know how the witness reading this speech is to make it evidence.

Mr. RODWELL: It has been suggested that the 4¼ per cent. which the Chartered Company are paying has been in consequence of the gas legislation of 1868.

Mr. DENISON: I object to your having things proved in this way. All I stated the other day was that the dividend had fallen to such an amount, and presumably it was in consequence of legislation. I may have been wrong, but if I was it is easy to prove it.

Mr. RODWELL (to witness): Without referring to any figures, knowing the state of legislation and the period of its commencement, can that diminution of dividend to 4¼ per cent. be attributable, in your opinion, to the legislation of 1868, as Mr. Denison has suggested?

Witness: No; because the Act of 1868, in reference to the supply of 16-candle gas at 3s. 9d. per 1000, will not come into operation until the 1st of January next.

Mr. RODWELL: Whether it be from mismanagement or accident, or from whatever cause, in your opinion, at all events, it is not attributable to what has been termed the harsh legislation of 1868?

Witness: No.

Cross-examined by Mr. DENISON: I have not calculated what the effect on the dividend of the Chartered Gas Company will be under the onerous provisions of the Act of 1868 when fully in operation. I am quite sure that, when they get their new works erected at Barking, they will be able to supply gas at a very low price. The short dividend for the last half year is due entirely to exceptional circumstances. I think the contingent-fund under this company's special Act of 1854 ought to be larger.

Mr. DENISON: The objects of that contingency-fund are defined in the Act to be, to meet all unforeseen liabilities and expenses. Would you consider a sudden increase in the price of coal or labour an unforeseen liability?

Witness: Yes; but that would be provided for by calling in the referees, who would raise the price of gas. I do not think that that ought to be provided for out of the contingent-fund. I think the company ought, with due care and diligence, to earn their prescribed dividend.

Cross-examination continued: I am not an advocate for competition in gas supply, unless the company does not fulfil its obligations to the public. I was one of the supporters of a competing company in Brighton, which did not get into operation—for this reason, that one of the two existing statutable companies had a bill in Parliament concurrently with ours, and they elected to put themselves under the same obligations which our new company proposed, and therefore there was no necessity for us to construct our works to supply gas, and we did not do it. I do not know what moved the people to get up this new company. I was simply their engineer, employed by the directors. I do not know what the effect of adopting the conditions of the new company by the old company has been with respect to dividends. I know that the dividends the first year were very small, and that they are manufacturing gas under great difficulty. All the companies with which I am connected have incorporated in their special Acts the provisions of the Gas-Works Clauses Act, and this gives them power to create a reserve-fund, which may be used towards paying back dividends for an unlimited time, and I believe this is the general rule, although there are a few companies

existing which have only power to pay three years back dividends; and I think there are one or two that have no power to pay back dividends at all, but I cannot mention the names of any of those companies.

Mr. DENISON: I must object to that unless you give the names. As I understand you, the general rule is that the immorality of the reserve-fund prevails?

Witness: Yes, it does, and there is great dissatisfaction in consequence.

Cross-examination continued: I know of a good many cases in which corporations have gas-works, and in these the results of accidents, or rise in price, or anything of that sort, come out of the rates.

By the CHAIRMAN: Have these companies any contingency-fund as well as reserve-fund?

Witness: They most of them incorporate the Companies Clauses Act as well as the Gas-Works Clauses Act, and that gives them power to create a contingency-fund. I want to state prominently to the committee that all these companies in the country are liable at any time to have rival companies started against them, whereas in London any attempt to do such a thing would be perfectly hopeless.

Mr. DENISON: That is to say, if they could persuade a parliamentary committee to do it?

Witness: They did it in the case of Brighton, but I cannot mention any other case.

Re-examined by Mr. RODWELL: There is an analogy between such a company as the Imperial Gas Company in London and these country companies, though a very wide one. Those in country towns are not districted, and are open to competition. The London companies should either be controlled by Parliament, or competition should be promoted.

Mr. CAWLEY: Did I understand you rightly to mean this, that, in your judgment, whether it is called a reserve or contingency fund, or whatever name may be given to it, that companies ought to have such a fund laid by to enable them to equalize expenses, but that it ought not to enable them to equalize dividends?

Witness: No, I do not mean that, because if it enabled them to equalize expenses, it would also, to a great extent, equalize dividends. There ought to be a contingency-fund sufficient to provide for any extraordinary occurrence, and to enable the companies to draw on this contingency-fund, application must be made to the justices, to whose discretion it is left by the Acts of Parliament of 1847 and 1868. I should consider any accident over which a company had no control a proper thing to entitle them to withdraw a sum from the contingency-fund, and I should limit the power to this condition.

By Mr. LOCKE: I do not think it is safe for the company to be entire judges of what they shall put money by for. A rise in the price of coal is provided for by the City Gas Act, 1868, section 68. I consider that the gas companies of the metropolis enjoy a perfect monopoly, and the consumer is totally helpless except as Parliament protects him. The 26th section of the Act of last year entirely expresses my mind as to the proper use of the insurance-fund. It is this clause which it is sought to introduce into this bill, striking out the one which the company have placed in it; which latter clause, if passed, would make the reserve-fund £230,000, in addition to the contingency-fund under the Act of 1854, amounting to £50,000, and together £280,000; and this sum could not benefit the consumer, but would, on the contrary, be to his detriment. I therefore think the legislation now proposed is necessary for the protection of the consumer.

Mr. DUFF: I want to ascertain the reason to which the reduction of the dividend of the Chartered Gas Company was attributable. Have you, Mr. Rodwell, anybody who can answer that question?

Mr. RODWELL: It is difficult for us, appearing against the gas companies, to give evidence of the reasons. We can only speak to facts. My friend, Mr. Denison, very properly objected to my reading the chairman's speech. We have not got the chairman here to cross-examine, and I am afraid I must leave matters as they are, unless my friend chooses to throw some light upon the matter.

Mr. DUFF: We were told it was in consequence of legislation, and now it is denied.

Mr. RODWELL: I think the next witness will be able to throw some light upon this matter.

By Sir J. GRAY: This company has a large capital. I think that if the contingency-fund were done away with it would have a very trifling effect. I propose that the company should deduct for the next five years 1 per cent. —that is to say, that their price of gas should be such as to enable them to earn their dividend, and 1 per cent. in addition to create a contingency-fund, which should not be drawn upon except for contingencies. The whole of the capital which has been subscribed since 1854 has been subscribed for under the powers of the company, as provided for in the Acts of 1854 and the General Act, although I should think it is very likely that the majority of the shareholders know nothing at all of the powers of the company, as very probably the directors, in asking for capital, did not put forth their powers. I think if these powers are inconsistent with the public policy they ought to be repealed, no matter whether the capital was subscribed for upon the faith of those powers or not.

Samuel Hughes, Esq., examined by Mr. RODWELL.

I am a civil engineer, and have devoted my time and attention to gas-works and gas engineering. I have taken a very prominent part in all these inquiries, both public and private, in both Houses of Parliament, with reference to the metropolis, since 1858. I am conversant with the different Acts of Parliament, and with the affairs of the metropolitan gas companies through their accounts. I think it would be highly desirable and requisite, especially so far as the consumer is concerned, that the reserve-fund of this company should be done away with, and that in its place an insurance-fund should be constituted similar to that introduced into the City Gas Act. I think that the effect of a reserve-fund is to postpone the reduction in the price of gas, as it can only be accumulated at the expense of the consumer, who ought to have the reduction due to the increased profits at once. I think, by the legislation of the last eight years, the metropolitan companies have been more confirmed in the possession of their districts, and made a more exclusive monopoly than perhaps any town in the kingdom where other companies may possibly come in. I know, from the published accounts, the financial conditions of the Chartered and Imperial Gas Companies.

Mr. RODWELL: Do you see any reason or justice why the same terms which have been imposed upon the Chartered Gas Company within the City should not be extended to the consumers out of the City?

Mr. DENISON: I venture to say that is not evidence.

Mr. RODWELL: This is a skilled witness.

Mr. DENISON: I object to that evidence; he is a skilled witness in matters of fact about gas.

Mr. RODWELL: Do you see any reason why the legislation which has been applied to the Chartered Gas Company should not be applied to the Imperial Company?

Mr. DENISON: I object to that equally.

Mr. RODWELL: My friend, Mr. Burke, gave his opinions pretty freely, I think; and I put it to the committee whether that is not a proper question. I do not understand what the objection of my friend is. If he will state his objection I will argue it.

Mr. DENISON: I object because I say it is a matter for the committee to judge of. This witness is skilled in matters of fact about gas and so on, and if he gives that evidence I shall not object.

Mr. RODWELL: If I were to look through the 3000 questions which were asked, I should think 2500 of them would be similar to the question I have just put, and I think it is rather late for my learned friend to take the objection; but, however, I will not press it.

Examination continued: I know that a clause, similar to that introduced into the City Gas Act, has been proposed in this bill with regard to the reserve-fund, which clause I think is perfectly fair between consumer and seller, and for these reasons:—The Imperial Company supplies a vast district of London of a highly improving character. They are under considerably more favourable circumstances than the Chartered. The Chartered are confined to a district where neither population nor the number of consumers can be expected to increase very largely. Looking at the district supplied by the Imperial Company, which is a superior class of property to that supplied by the Chartered, I take it that the prospects of the Imperial are superior to those of the Chartered, and I cannot see that any legislation of that kind applied to the Chartered Company could operate injuriously to the Imperial Company.

Cross-examined by Mr. DENISON: I think the dividend of 4½ per cent. of the Chartered Company is entirely due to the difference in cost of raw material during the last two years. I find that in 1867 the profit of the Chartered Company was about 10½d. per 1000 feet, sufficient to pay 10 per cent. dividend, but I find in the next year it costs them for raw material very nearly 4d. per 1000 feet; so that the profit was reduced to about 7d. per 1000 feet sold, which only enabled them to pay 4½ per cent. dividend. I believe to that circumstance alone the falling off of the dividend is attributable. The Chartered for years have been working at great disadvantage; they pay a higher price for coal, and get less for their production than any other company, owing to their distance from the railways and convenient water carriage, and things of that sort. No doubt when they get their works down the river they will get much more for their production, and will be able to get coal at a less price. I cannot trace any diminution of dividend to the legislation of 1868.

Mr. DENISON: Did the Chartered Company raise the quality of their gas at all last year?

Witness: That is a question which must be very carefully considered. I am quite aware that they are professing now to supply 14-candle gas, and a year or two ago they were only obliged to supply 12-candle gas; but I say it is very difficult to ascertain it, on account of the very different burners by which the gas is tested, and I can say that the gas now called 14-candle gas is in reality only 12-candle gas. I am constantly in the habit of testing the gas of the Chartered Company which is supplied to my house, and I am prepared to say it is not a whit better than it was five years ago. The whole question about testing is in a very unsettled state; the instructions to the examiners are not even complete as to testing.

Cross-examination continued: I do not know that the Chartered Company are using more cannel than they did. I do not know that they say so. I never heard any one say so on the part of the company.

Mr. DENISON: Have you no reason to believe it?

Witness: I may have some reason, because I see the price of raw material has risen, but whether from using more cannel coal or from a natural rise in the price of coal I cannot say.

Mr. DENISON: Do you seriously mean to tell me, sitting there, you having been sworn to give this evidence, that you do not believe the Chartered Company use more cannel now, and that every other gas company knows it?

Witness: I cannot go that length.

Cross-examination continued: I have been engaged for the last 10 years in every metropolitan gas inquiry, in giving evidence against the companies, except for companies formed to erect new works, and which are now in operation. I am consulted a good deal by corporations. I have been employed a good deal by the engineer of a gas company—the Neath Gas Company—which is now erecting gas-works. I have criticized the plans, and suggested alterations. For their bill I gave evidence in Parliament. It was a competing company, but they have now bought up the old company. They were not obliged to do so, but there was some arrangement about an offer made within a certain time. I was engaged upon the Act of 1860 a good deal. I certainly think the consumers are entitled to any reduction of price that can be effected consistently with the arrangements of 1860.

Mr. DENISON: It would, of course, be to the benefit of the consumer if the price were reduced by force and the dividends too?

Witness: By force? Any reduction of price taken by itself, without looking any further, is, of course, to the benefit of the consumer, and it would be to his benefit if the dividend were reduced from 10 per cent. to 5 per cent.

Cross-examination continued: I think the bargain of 1860 ought to be kept to as regards dividend, but not as regards the reserve-fund, as this latter was not much considered in 1860; but it has been much considered by the committees of 1866 and 1867, and in the latter of these years there was a long report. I suppose the companies consented to the limitation of payment of back dividends to six years, because it was felt to be very unfair to allow back dividends, however far back, to come out of capital; and the committee, therefore, did not interfere with the reserve-fund, but they altered the law as regards back dividends, limiting them to six years.

Mr. DENISON: You seem to think that the bargain of 1860 may be undone in this respect.

Witness: There has been more recent legislation. The matter has been much more considered by the committees of 1866 and 1867, and in 1867 especially there was a long report upon it.

Mr. DENISON: I ask you whether, a bargain having been made in 1860 between you and the promoters of the Metropolis Gas Act and the companies, you think that bargain should now be altered in favour of the consumers?

Witness: You are asking me to assume that a bargain was made. I do not know that a bargain was made which was to last for all time. It may have been only an arrangement to try how it worked.

Cross-examination continued: Very few of the London gas companies have any reserve-fund at all, with the exception of the Commercial and Imperial Companies. I do not know whether the Chartered Company have the power to create such a fund; I suppose they had under the Act of 1860, but in point of fact they have not done so. The Imperial Company have created such a fund, and they say it is necessary to equalize their dividends, but the other companies do not seem to think so. I believe that those companies which have the reserve-fund created originally under the Gas-Works Clauses Act, 1847, have not also a contingency-fund. I think all of them have either a reserve or a contingency-fund. I have no reason to consider that the Act

of 1860 was a bargain binding for any length of time. The Metropolitan Board of Works adopted that bill between the Commons and the Lords, and there was a provision inserted that they should pay the costs of it. I think it was at that stage it was introduced to the House of Lords as a bill agreed upon between the parties except as to one or two incidental points. I do not know the gas-rental per mile of main of the Chartered Company, but I know that it is more than that of the Imperial Company. I do not, however, consider that as a fair test, because in a district like the Imperial Company's, running into the suburbs of London, some of the outside mains are probably very small. What I consider a fair test is the absolute sum laid out by each company on the distributing apparatus as compared with their capital. Country companies have a higher price for gas supplied in their suburban districts, because they have to lay a great length of unproductive main for the purpose; but that does not apply to a company like the Imperial.

Mr. DENISON: You said there was a distinction between London and country companies, because in the latter there is competition. Will you mention any large towns in which real competition is going on at present?

Witness: It is difficult to know what you call real competition. I know of towns where two gas companies are supplying the same streets; for instance, in Birmingham and Glasgow.

Mr. DENISON: No real competition?

Witness: I do not believe there is real competition, though they sometimes set up that there is.

Re-examined by Mr. RODWELL: Where there is no actual competition, the fact that there is power to compete has the effect of causing reduction in the price of gas. In many cases new companies are started to compete with existing companies with the same result. At present the price of gas in Birmingham is only 2s. 6d. per 1000, with 10 per cent. discount, making it 2s. 3d. I attribute that to the fact of there being two companies with the power of competition. No such effect can be produced in London. When a company like the Imperial makes 10 per cent. dividend, and has accumulated a large reserve-fund, they have no inducement to economize in any way, and thus be enabled to reduce the price of gas. I do not think the arrangements made in 1860 precluded the right of Parliament to deal with the question again whenever any of the companies came for fresh powers. The necessity of so dealing with them was admitted all through that inquiry.

By Mr. DUFF: I say that the falling off in the dividend of the Chartered Company is attributable to the difference in the cost of the raw material, and that it is not attributable to legislation in reference to the price of gas. There is every prospect of the dividend being smaller, unless there is a change in the cost of production and the price of coal. No doubt the removal of their works may make a great change, and that removal will take place shortly after the Act of last session comes into operation. I agree in the remarks of the chairman of the company, that the depression is quite a temporary affair, and that when they get established at their new works the dividends will rebound to their former state.

By Mr. CAWLEY: I do not think it necessary that they should have a reserve-fund for the purpose of making up that loss of dividend any more than for the purpose of floating capital. I do not see any greater hardship in the shareholders of a gas company having to run the risk of loss of profit from the advance of the price of materials, nor of their having no opportunity of gaining the advantage of a fall in price, than any other trade. There must be fluctuations. Other trades have not the advantage of being free from competition, nor do they derive the benefit of monopoly. There is a great deal to be said on both sides of the question.

Mr. CAWLEY: I want to get your view. You think, when they are limited to the 10 or 7 per cent., it should be restricted to the particular year, and that if in any one year they can gain something more, it ought not to go to make up the loss of subsequent years arising from the increased cost of material?

Witness: I do not think it ought to be made up from a large sum like the reserve-fund, but I think it would be quite fair to carry over a small balance from one year to another. They naturally do so. I do not advocate an immediate reduction of price; it is a thing which adjusts itself in the course of years. I do not think they ought to have a large amount of reserve-fund of that kind.

Mr. DENISON: Will you tell me where there is any power to carry over any balance?

Witness: Practically they must do so, because every gas company has a certain amount of floating capital to carry on their works with; though there is no absolute power to have it, they must have it.

Mr. CAWLEY: Perhaps you will tell us what proportion of balance you think they ought to be permitted to carry over.

Witness: Perhaps to an extent which would make 1 or 2 per cent. extra dividend. I do not think that would be interfered with, though it may not be strictly legal, and I dare say the floating capital is not legalized.

Mr. CAWLEY: Would you allow them to carry that over from one year to another?

Witness: A small amount; but I would rather be excused from naming any particular amount. I would not call upon them to make an immediate reduction of price, but I would carry it over, and try it for another year.

By Mr. LOCKE: I think the 68th section of the Act of 1868, which empowers the commissioners to alter the illuminating power and price of gas, is sufficient to protect the companies against any irregularities in the cost of materials. The clause now proposed, which enables them to raise one-twentieth of the paid-up capital as a contingency-fund to meet the loss by accidents over which they have no control, is sufficient.

By Sir J. GRAY: We have no officer at the present moment appointed for the purpose of testing the illuminating power of the gas supplied. The parishes, as a rule, have very much neglected the obligations of the Metropolis Gas Act. I believe the Act imposed the obligation of appointing an examiner, but it has been almost universally neglected. One or two of the largest parishes, such as St. Pancras and Marylebone, have examiners, but the great majority of the parishes have neglected to appoint one. The Metropolitan Board have recently appointed an examiner to test the gas in the Chartered district outside the City.

Sir J. GRAY: I want an explanation about an answer you gave in reference to 14-candle gas and 12-candle gas. You say that one company which gave 12-candle gas afterwards professed to give 14-candle gas, and that by repeated tests you found that in reality there had been no alteration in the illuminating power.

Witness: I speak of my own individual tests. I have been in the habit of examining the gas supplied by the Chartered Company, and I am prepared to say that there has been no alteration in the illuminating power, Many people say that the gas is worse than it was some years ago. I am quite prepared to hear that the examiners, unless they take care as to what burners they use, will say there has been an increase. It is difficult to decide what burner should be used. The burner for theoretical purposes may give a high result, but the consumer in fact cannot realize that result.

Sir J. GRAY: I understand you to say that a great many people are under the impression that the quality of gas has deteriorated instead of improved.

Witness: Yes; I know that that impression is very generally entertained in this very district.

Sir J. GRAY: What is your own impression?

Witness: My own impression is that it is no better than it was five years ago. I have heard many complaints about the cannel gas supplied. Many consumers say it is no better than common gas.

Mr. DENISON then addressed the committee upon the clause. Upon the whole he did not know that he had much to complain of in it, because both the witnesses had admitted that the bargain of 1860, as he ventured to call it, ought if possible to be adhered to. Both had admitted at least that accidents, in the nature of a rise in the cost of materials or labour, ought not to fall upon the shareholders, but upon the public at large. But by the 68th clause of the Act of last session such a contingency was not provided for. The only thing which the commissioners, on a revision of the price of gas, would be able to take into account in reference to the past was, "the excess of surplus, if any, carried in the then last preceding year to the credit of the divisible profit and to the insurance-fund of the company." There was, therefore, no reserve-fund, and a loss once incurred was a loss for ever, because the contingency-fund was not applicable to a loss from a rise in the cost. Mr. Stevenson admitted that it ought to provide for a rise in price as well as other things, and he (Mr. Denison) pointed it out as a defect in the legislation of 1868—whether by intention or not he knew not. It might happen, too, that by an accident over which the company had no control, the whole of the dividend of the year was swept away, and yet the referee, with the greatest possible prejudice in favour of the company, could not give them a halfpenny to make it up. What was the reserve-fund for? Why, to do that very thing, of course. And here there were two witnesses who said that provision ought to be made to keep up the dividend, suggesting a clause which did precisely the contrary. Mr. Hughes ended by saying: "I think there ought to be some power, which I admit is not at present legal, to make up a deficiency in the dividend of 2 or 3 per cent." That was exactly what the company wanted, as Mr. Burke told the committee, although he was not particular as to the precise amount of it. All the company wanted was some substantial security for the dividend being kept up to that which even Mr. Cardwell said it ought to be kept up to, if possible; but Mr. Cardwell, either by accident or design, committed the blunder which he had pointed out. It seemed to him, therefore, that the evidence of the two witnesses was gone with regard to the reserve-fund. They said there ought to be the means of equalizing the dividend, and one suggested a piece of machinery which he was not lawyer enough to carry out, and the other a contrivance which was not in the Act. Now, luckily, in the case of the Imperial Company, there was a provision in existence under the Gas-Works Clauses Act, 1847; the special Act of the company, 1854, and the Metropolis Act, 1860, applicable to this point. With reference to the latter Act, in connexion with Mr. Hughes's evidence, he had some observations to offer. Of course, he could not complain that Mr. Hughes refused to admit that he was one of the authors of that bill; although, on being pressed, he did admit that the very people who were now seeking to have this absurd clause of Mr. Cardwell's introduced into the present bill were the people who, during the passage of the Metropolis Gas Bill from the House of Commons to the House of Lords, in 1860, adopted that bill, paid the expenses of that bill, and went to the House of Lords saying it was an agreed bill. He (Mr. Denison) was then against the companies, and was for Mr. Hughes's bill, and had to open it; the bill was accepted as an agreed bill, and no evidence was gone into touching the merits of it in the slightest degree. If there was a bargain of that kind made between the Metropolitan Board and the companies, or between Parliament and the companies, then he should be glad to know what pretence there now was for undoing it. If it was said that the Act had failed, as it had been said, with regard to inspection, the companies would say, as it had been said before, "You shall have it cured, on any point of that kind." That was said in 1866, before Sir John Trollope's committee. The companies, indeed, went so far as to put down in writing a number of things with regard to inspection, which they were perfectly willing to consider; they went further, and they said, "We are willing to have the amount of the reserve-fund considered, and a number of other things also, of which the payment of back dividends was one." All these things the companies had said whenever there had been an application made against them, suggesting that the Act of 1860 had not fulfilled its intention. But when parties came forward to say, "We want the Act of 1860 altered, in order to make it do something which was not intended—viz., to cut down the dividend whenever there is a chance," then he asserted that that was a distinct repudiation of the bargain then made. And he would say again, that every penny of money which had been raised by this company since 1854 had been raised upon the footing of having a reserve-fund for an unlimited time under that Act, and for six years since the Act of 1860. Mr. Stevenson had the boldness to say, in answer to a member of the committee, that the public did not enter into these matters when they were asked to take shares; but this was assuming a greater amount of greenness in the committee, he thought, than the committee would assume with regard to him.

Sir J. DUCKWORTH: Besides, it would affect the shares in the market.

Mr. DENISON said not only that, but it would interfere with right and justice upon the subject. The learned counsel proceeded to read and comment upon the evidence given on the former inquiry before this committee, as to the effect upon the profits of the company by the reduction of 3d. per 1000 cubic feet in the price of gas, and the additional necessity thus created for the reserve-fund. He then passed to the evidence of Messrs. Stevenson and Hughes, and the opinions expressed by them with respect to the monopoly possessed by the metropolitan companies. These two gentlemen were standing witnesses, if he might say so, against companies and for corporations. He said "corporations," because he was sure the remark was not an unnatural one. He mentioned on a previous day that it had been in contemplation by the Metropolitan Board to take possession of all the London gas-works. For the present purpose it was quite immaterial what price they were to pay for them. If the Metropolitan Board did take possession of these works, every accident of every description, whether from bad management, explosions, or the advance in the cost of materials or labour, would fall upon the ratepayers, and yet it was suggested by the Metropolitan Board, who called themselves the representatives of the ratepayers, that they ought to have these works. If they ought to do so they ought to pay the costs of these contingencies. The Gas-Works Clauses Act and the Metropolis Gas Act provided that the ratepayers should bear these contingencies, unless they were clearly the fault of the companies themselves. But, said Mr. Stevenson, the making of a reserve-fund is immoral. The extent to which that immorality prevailed might be judged by the fact that the creation of such a fund was almost universal. But Mr. Stevenson admitted that the immorality ceased as soon as the fund was made up, because then

the public got the benefit of the increased profits of the company. So that all this question of immorality applied simply to the three or four years during which the fund was accumulating. This was a matter which he (Mr. Denison) was fully prepared to leave to the discretion of the committee, which he should do with the confident belief that they would adopt the views of his witnesses, and say that the 10 per cent. should be kept up if it reasonably could be. At any rate, they would adopt this conclusion—that it was a bargain between the companies and the Metropolitan Board in 1860, which ought not now to be departed from. He might tell the committee that the question of the reserve-fund, in the present condition of the Imperial Company, with all the money they had to lay out, and with the contingencies to which all companies were liable, was regarded by them as a vital one.

The CHAIRMAN: Is the company's contingent-fund left as it was under their Act of 1854?

Mr. DENISON: Yes.

The CHAIRMAN: There was no reference to that in your money bill in 1866, and it is not increased under the present bill.

Mr. DENISON: No; it stands at £50,000. But I need not tell you that it is not applicable to making up dividends.

The CHAIRMAN: I was perfectly aware of that.

Mr. RICHARDS: It is set aside before the balance of profit and loss is struck.

The CHAIRMAN: You do not wish, Mr. Denison, to make any absolute proposal.

Mr. DENISON: I think the company would be safe, at any rate, to the extent that Mr. Hughes suggested, of making up 2 or 3 per cent., with a reserve-fund of one-twentieth of their capital instead of one-tenth. We do not want anything except to make ourselves safe. But that reminds me of something I forgot. Both the witnesses called on the other side said the public got no benefit from the reserve-fund. But they forgot that the interest on that fund is part of the profits of the company, so that they really do get the benefit of it.

The CHAIRMAN said the capital to be raised under the bill would be raised at 7 per cent. He wanted to know whether the company would have power to pay their original shareholders 10 per cent. before paying the 7 per cent. to the new shareholders.

Mr. RICHARDS, in reply, referred to the case of *Maughan v. the Leamington Gas Company*, in which it was decided by Vice-Chancellor Wood that the 7 per cent. shareholders were entitled to their dividends in the first instance, and that the 10 per cent. shareholder must run the risk of the balance of profit and loss being sufficient to pay the two. The Imperial Company, to make the matter perfectly clear, had passed a resolution at a general meeting, that if the balance of profit and loss was insufficient to pay both the 10 per cent. in full and the 7 per cent. in full, the loss in the first instance should fall upon the 10 per cent. shares.

The room was them cleared, and after some time the counsel and parties were again called in.

The CHAIRMAN: The committee are of opinion that the reserve-fund should be limited to one-twentieth of the existing capital, and the clauses will have to be altered in accordance with that decision. Clause 17 has been struck out by the committee, with a view to inserting a clause containing such a provision as I have mentioned.

Mr. RICHARDS: I presume, sir, you mean the existing capital—existing at all times.

The CHAIRMAN: No; the present capital—that is, £1,600,000 in round numbers. It is not to apply to the capital asked for under this bill.

Mr. RICHARDS: The existing capital is £1,300,000, and £325,000 to be raised under their Act, equal to £1,625,000, one-twentieth of which is £81,250.

Mr. RODWELL: I presume, then, that the contingency-fund under the existing Act—£3000 a year—is disposed of.

The CHAIRMAN: That remains. The committee have come to the decision that the contingent-fund should continue as it is at present, limited to £50,000 under the Act of 1854.

Sir J. DUCKWORTH: The question arose whether we would adopt the insurance system or this, and we are of opinion that this plan is much more beneficial to the consumer.

Mr. RODWELL: I am sure you will excuse me, sir, but I wish to inquire whether we are to understand that the committee have done away with the reserve-fund which the company had under the General Act and the Act of 1860. Do I understand that they have no longer a reserve-fund out of which they are to pay back dividends?

The CHAIRMAN: No; it is proposed to modify the powers which they have under the General Act, and to allow the company to lay aside a reserve-fund equal to one-twentieth of the existing capital of £1,625,000, which will amount to £81,200, out of which they will have the power of making up back dividends.

Mr. RODWELL: Then do you introduce what I may call an insurance clause?

Mr. RICHARDS: No.

The CHAIRMAN: The contingency-fund under the Act of 1854 will continue in operation.

MONDAY, MAY 10.

Mr. DENISON, in reply to the chairman, said two clauses had been sent to them by the Metropolitan Board, which, as far as they went, appeared to be unobjectionable. The first related to the contingent-fund, and was in place of the clause which the committee had rejected. It was as follows:—"The interest upon the contingent-fund of £50,000 formed under the 31st section of the Act of 1854, as often as the same shall amount to that sum, shall be carried to the credit of the fund available for dividend." The second clause, dealing with the reserve-fund, was this: "Notwithstanding anything in this Act, or in the recited Acts, or any Act incorporated therewith contained, the reserve-fund of the company shall never exceed in amount the sum of £81,250. But this provision shall not affect the powers of the company under the before-mentioned section of the Act of 1854, with respect to a contingency-fund."

Mr. CRIPPS said he had now to propose, on behalf of the Metropolitan Board, an addition to this latter clause. He proposed to add the words: "but such contingency-fund shall be applicable only to meet any extraordinary claim or demand which may at any time arise against the company from accident, which due prudence and management could not have prevented." Even supposing there was no precedent for this, it was quite clear that unless such words were introduced there would be no real difference between the reserve-fund for the payment of dividend and the reserve-fund for contingencies, because a claim on account of some unforeseen matter of course applied to any contingency, such as a rise in the price of coal or a fall in the price of residual products. All this was foreseen when the case of the Chartered Company was before Mr. Cardwell's committee, and then an insurance-fund only was allowed. That company had no reserve-fund to fall back upon for the payment of dividend as the Imperial had. Even with their having only a contingency-fund it was thought that it would not be reasonable, as against the consumers, that they should be allowed to resort to the contingency-fund, in order to remedy their own negligence or to provide against the ordinary incidents of trade, but that they should only be able to resort to it when there was some unforeseen accident which no prudence or due management could prevent happening. So far from the Imperial Company showing a reason why they should be in a more favoured position than the Chartered Company, they showed that they had the other reserve-fund, which the Chartered Company had not. Under these circumstances he apprehended that the committee would deem it fit to insert the words he proposed, they being already in the City Gas Act.

Mr. DENISON said it did not seem to have occurred to his learned friend that it was his business to show cause why the existing constitution of the company should be altered. Having got the reduction of the reserve-fund by reason of there being the contingency-fund under the Act of 1854, his learned friend now asked to have the application of that fund altered. And how? Whereas, under the Act of 1854, it was applicable to meet all unforseen liabilities and expenses, it should in future only be applicable to such things as in strict law and as a jury might find the company could not have prevented. In short, the proposal was that, unless the company could fix the cause of anything which diminished their dividend upon some one not employed by them and not connected with them, they and not the public must bear the risk of it. He (Mr. Denison) considered that this was unfair after the concession made on the previous Friday, and unfair considering the circumstances under which the capital of the company was raised. Because Mr. Cardwell imposed such a condition upon the Chartered Company, was no reason why this committee should deal thus with the Imperial Company.

The counsel and parties were directed to withdraw, and on being called in again,

The CHAIRMAN stated that the committee accepted the two clauses with the addition proposed by Mr. Cripps.

Mr. DENISON wished to add the words "or circumstances" after the word "accident" in the last clause.

Mr. CRIPPS objected, and

The CHAIRMAN said the word "circumstances" might apply to an increase in the price of coal, and certain matters which the committee considered ought not to come under the provisions of the contingency-fund.

On clause 26, relating to the illuminating power of the gas to be supplied,

Mr. CRIPPS proposed to strike out the clause as it stood in the bill, and substitute a new one.

Mr. DENISON said the clause as it stood in the bill had first to be proposed. It was as follows:—"After the 1st day of January, 1869, the maximum price of gas sold by the company shall be 4s. per 1000 cubic feet, in lieu of 4s. 6d." That was not proposed to be interfered with by the other side. Then it went on: "The maximum price at which gas shall be sold by the company shall be 3s. 9d. per 1000 cubic feet." To that point they were agreed, as the difference only arose as to the illuminating power—"and the illuminating power of the said gas shall be equal to 14 sperm candles, in lieu of 12 sperm candles, as prescribed by the said Act. And the said Act, as far as relates to the company, shall be read as though the said price of 4s. per 1000 cubic feet, and the said illuminating power of 14 sperm candles, had been thereby prescribed, subject and without prejudice to the powers given by this or any other Act to the President of the Board of Trade to raise the price of gas to be supplied by the company to any sum not exceeding that limited by the Metropolis Gas Act, 1860, or to alter the standard of illuminating power within the limits hereinbefore prescribed." The corresponding clause, proposed by the other side, was: "The gas (except cannel gas) supplied by the company shall, subject to the provisions of this Act, be of an illuminating power as follows:—1. From the 30th day of September, 1869, until the 1st day of January, 1871, of an illuminating power of not less than 16 candles." It was not necessary to say much at present on the subject, as the question was fully gone into when the bill bill was before the committee on the former occasion. The committee knew thoroughly that two candles represented £50,000 in money. He might as well mention, as one of the differences between the bill of the Imperial and that of the South Metropolitan Company, who were charging 3s. 4d. per 1000 cubic feet, and the difference between this bill and that of the Chartered Company. It was this: the Imperial Company took only 7 per cent. upon their additional capital, which, in round numbers, was one million. It was, therefore, quite evident that upon that million they gave the public 3 per cent. at once. The Imperial Company, in consideration of the illuminating power of their gas being fixed at 14 instead of 16 candles, did not think they had a right to complain of being limited to 7 per cent. upon their new capital, although, of course, they would like it otherwise. It was a present to the public of £40,000, or very nearly the value of the two candles. The committee would not have forgotten that the 3s. 9d. was put upon them, and was not proposed by the company.

The CHAIRMAN: Yes, and the date was fixed by the committee.

Mr. CRIPPS said, with regard to the illuminating power, of course the question would be now open upon evidence either way, but for the consideration upon whom the onus should be thrown of showing that 14-candle gas ought to be supplied at the price named in the bill. He believed that the onus was on the other side, inasmuch as, after the matter had been thoroughly discussed in former years, the committee came to the conclusion that the fair and proper price for 16-candle gas was 3s. 9d. The only question was whether there was anything in the condition of the Imperial Company which made that an improper obligation upon them which was considered a proper obligation upon the City companies. They now came for favours from Parliament just as the Chartered Company did last year, when the opportunity was taken for fixing what was thought to be a proper price.

The CHAIRMAN: Allow me to ask why you did not raise this question when the Metropolitan Board was before us on the previous occasion? The point was not raised; there was a little examination in reference to the 16-candle illuminating power upon the part of the promoters of the bill, and I asked some questions myself; but the Metropolitan Board then stated that they were satisfied with 14 candles.

Mr. LOCKE: The Metropolitan Board of Works did mention the 16 candles.

The CHAIRMAN: And said they were satisfied with 14.

Mr. LOCKE: I think not.

Mr. CRIPPS said Mr. Rodwell read the resolutions of Mr. Cardwell's committee.

The CHAIRMAN: But he did not insist upon the point, and he declined to call any evidence. It was a point which the committee took into con-

sideration, and they regretted very much that no evidence was called upon it. The only evidence called so far satisfied the committee that 14-candle gas was sufficient.

Mr. CRIPPS said, whether rightly or wrongly, the Metropolitan Board, on the previous occasion, considered that the question having been gone into before Mr. Cardwell's committee, and a decision having been come to in the case of the Chartered Company, it was unnecessary to reopen it. They assumed that the Imperial Company would be put in the same position as the Chartered Company was last session.

Sir J. DUCKWORTH: I do not think, from the Act of 1868, that the committee were perfectly satisfied with regard to the 16-candle gas, otherwise they would not have put in the 55th clause empowering the gas referees to reduce it.

Mr. CRIPPS: No doubt. I take that as part of the legislation, and suggest the same clause as being proper in the present bill.

Sir J. DUCKWORTH: The 55th clause seems to indicate that the committee thought they were going pretty high in reference to the 16-candle gas.

Mr. CRIPPS: I do not know that I quite agree in that, because this clause enables the referees to raise it as well as to make it less.

Mr. DENISON: We must have a year of ruin first.

The CHAIRMAN: I referred carefully to the evidence taken before Sir J. Trollope's committee and Mr. Cardwell's committee, and read what seemed to me the material parts of that evidence, and certainly I was under the impression that some of the greatest authorities, amongst whom was Dr. Letheby, considered 14-candle gas amply sufficient for the City of London. Having these facts before us, and no evidence having been called by the Metropolitan Board to negative those opinions, we were certainly not in a position to impose 16-candle gas upon the company. It was simply mentioned by Mr. Rodwell that, by the Act of 1868, the City gas companies were obliged to provide 16 candles illuminating power, and then he said he did not appear as an opponent to the bill, but thought it his duty to call the attention of the committee to these facts, and leave them to deal with the matter as they thought fit. Mr. Rodwell did not even cross-examine witnesses upon the point.

Mr. CRIPPS said the impression was that it was not worth while to call evidence upon a question which was regarded as settled.

The CHAIRMAN: The committee were really left to cross-examine the witnesses. I know that it has gone forth that the committee have not adopted all the suggestions that were laid before them by the Metropolitan Board; but the truth is, the committee and I, as the chairman, were left to cross-examine witnesses, and I did it very fully on this point of illuminating power; therefore, unless we have further evidence before us, I do not see how we can entertain this clause.

Mr. CRIPPS said he proposed to call evidence, having referred to what had been done in former years, and having pointed out that there was nothing in the condition of the Imperial Company which would justify an exception in their case from the general rule with regard to all companies.

The CHAIRMAN: You are aware that the committee in this bill have raised the illuminating power 2 candles.

Mr. CRIPPS: That was suggested by the company.

The CHAIRMAN: If they had not come to Parliament they might have continued to supply 12-candle gas.

Mr. CRIPPS said it was suggested in Mr. Cardwell's report that the necessity for companies to come to Parliament was the opportunity for Parliament to deal with them, and that when they came to ask favours was the time that conditions should be imposed upon them. Referring to the clause he had proposed, he said such a clause might be considered a very hard one in the case of the Chartered Company, which had no reserve to fall back upon to make up their dividends in the event of the price and illuminating power imposed failing to yield sufficient profit. But the Imperial Company could not say that, because they had a reserve-fund out of which to recoup themselves.

Mr. DENISON: That is all wrong. They have nothing of the kind. The reserve-fund is nothing like so much as one year's dividend.

Mr. CRIPPS: I am not supposing you would lose the whole of one year's dividend. It is not in the least degree probable that the difference between 14 and 16 candles would make any great difference in your dividend.

Mr. *G. W. Stevenson* recalled, and examined by Mr. CRIPPS.

I am aware of the provision in the City Gas Act by which the companies are required to supply 16-candle gas. That clause is applicable to the Chartered Company, part of whose district is outside the City. The works of the Imperial Company are conveniently situated for supplying their district, much more so than those of the Chartered Company for supplying their district. The two districts are in part conterminous. There is nothing which would justify a difference in price, or a difference in illuminating power. On the contrary, I think the Imperial district is more favourable for the supply of gas at a cheap rate than the Chartered district; and as compared with the district of the South Metropolitan, it is infinitely superior. The latter is a more suburban district, and yet the company are realizing their maximum dividend with a price of 3s. 4d.

By the CHAIRMAN: The illuminating power of their gas has practically been 14 candles. They are under the Metropolis Gas Act of 1860, and that is 12 sperm candles.

Examination continued: I cannot tell what illuminating power the Imperial Company were supplying immediately before the passing of the Act of 1860, but when they were in Parliament, in 1854, it was given in evidence.

Mr. DENISON objected that that evidence was not before the committee, and the witness could not speak to the point from his own knowledge.

Examination continued: Prior to 1860 the company were charging 4s. 6d. per 1000 feet. In 1854 they capitalized £260,000 of profits, converting them into £130,000 of stock bearing 10 per cent. dividend. I do not know what price they charged, or what illuminating power they gave prior to that. They were not then free from competition. In 1860 competition was entirely removed by legislation. I have heard it said that the increase of illuminating power from 14 to 16 candles would amount to the sum of £50,000. That is calculated upon the statement made in the 55th section of the City Gas Act, 1868. It is assumed from the evidence given by the companies that the cost would be 2½d. per candle, which, in my opinion, is not the fact. My construction of this clause is that, inasmuch as the companies laboriously stated the cost of each candle of illuminating power to be 2½d., this clause was inserted, or rather this price was inserted, as a penalty upon the companies if at any time they should reduce the power below 16 candles. It is a penalty upon reduction, not a premium upon increase. The clause does not anywhere state, nor can it be drawn as inference from the clause, that the cost to the company is 2½d. It is really a penalty upon reduction.

Mr. CRIPPS: That is to say, if you knock off the candle power, there shall be a proportionate reduction of the price charged, at the rate of 2½d. per candle?

Witness: Yes; and I venture to say companies would never seek for a reduction on those terms. It is founded upon the evidence given by them for another purpose, that if they had to raise the illuminating power, it would cost them that. The committee adopted their evidence, and put it in this way. I say that 2½d. per candle does not in any way represent the cost of increasing the illuminating power. In order to raise the illuminating power of ordinary coal gas from 12 to 14 sperm candles, Mr. Burke says, they use from 8 to 10 per cent. of cannel coal. Then we have the following:—18 cwts. of coal, at 17s. per ton, 15s. 4d., and 2 cwts. of cannel, at 25s. per ton, 2s. 6d.; making a total of 17s. 10d., or 10d. more than if coal only were used, and that is 1·04d. for raising 9580 feet of gas from 12 to 14 sperm candles, which is equal to ·52 of a penny per candle, or a little over a halfpenny. Then it is said that the residual coke from Wigan cannel is not so valuable as that from Newcastle coal (though I do not admit that); but against that we have the increased yield of gas; 18 cwts. of coal, yielding 9500 feet of gas per ton, will give 8550 feet, and 2 cwts. of cannel, which yield 10,300 feet, as admitted in the evidence of the Western Gas Company last year, will give 1030 feet; and these added together will give 9580 feet, which is 80 feet per ton more than if Newcastle coal only had been used. When the value of that gas is ascertained, it will be seen that it is ·34d. per 1000 feet; so that, in any way, the increase of illuminating power from 12 to 14 candles cannot mean 5d. to the company.

The CHAIRMAN: The committee are aware of the circumstances connected with the increase of price, owing to the increase of illuminating power and the reduction of price to the consumer. The reduction of price to the consumer represents £30,000 a year, and the increase of illuminating power of 2 candles £50,000, making a total of £80,000.

Mr. CRIPPS (to witness): The real point of comparison is £50,000 as against, say, what?

Witness: As against, say, £5000. The cost of rising from 14 to 16 candles would be a trifle more than rising from 12 to 14, and I will take the whole cost of the cannel, which is a halfpenny, which would be one-tenth of the sum Mr. Burke has stated, and that would be £5000. That is the increased cost to the company of giving 16-candle gas instead of 14. If 16-candle gas were supplied instead of 14, the consumer would burn less of it, and his payments to the company would be less—he would get greater light for less money.

Sir J. GRAY: You have stated £5000. Do you count a halfpenny for each candle or for 2 candles?

Witness: I am obliged to you for the correction. It should be £10,000—£5000 for each candle.

Cross-examined by Mr. GREENWELL: Until the Act of 1860 the maximum illuminating power was 12 wax candles. There was no practical increase of illuminating power between 1854 and 1860.

By Mr. DENISON: The additional cost of raising the illuminating power from 12 to 14 candles would be a halfpenny per candle; from 14 to 16 a little more. I am aware that Mr. Cardwell, in his report, stated that the reduction of price, as it would have stood if the companies had accepted the decision of the committee, would have been about 2½d. per candle, but that has nothing to do with the cost to the companies; it is the difference in the price to the consumer. I am aware that Mr. Cardwell has again stated the same comparison in the case of the South Metropolitan—namely, 3s. 4d. for 14-candle gas is nearly equivalent to 2s. 2d. for 16-candle gas. That is to the consumer. The proportion at per candle is no doubt what Mr. Cardwell states, but that has nothing to do with the cost to the company. It includes dividend, and all sorts of things.

Sir J. GRAY: What are the "all sorts of things"?

Witness: It includes management and wear and tear, which would be precisely the same whether the company supplies cannel gas of 20-candle illuminating power or common gas of 12 candles. It includes the cost of distribution, which would be about the same; and it includes dividends, law expenses, rates and taxes, and everything, in fact; not simply the cost to the company of the illuminating agent, but the whole business of the company and the profits made out of the consumer.

Mr. DENISON: Is Mr. Cardwell, according to your opinion, wrong in saying that 3s. 4d. for 14-candle gas is equivalent to 3s. 9d. for 16-candle gas?

Witness: No, certainly not. It bears that relation to the consumer.

Mr. DENISON: You say people would consume less 16-candle gas. How do you know that?

Witness: They do consume less; they are obliged to do so.

Mr. DENISON: Has the consumption of gas become less in London since the companies have raised the quality?

Witness: No.

Mr. DENISON: I do not mean all over London—that answers itself. I mean the consumption in each house.

Witness: No; because people go on increasing the number of their burners. It is well known if you continue to supply the same quality of gas, and do not increase or reduce the illuminating power, the consumption goes on, people increase the number of their burners—there are many ways in which it goes on increasing.

Mr. DENISON: I thought I heard a complaint against the companies that, for some unknown reason, the same number of burners in a house consumed more gas with an improved quality.

Witness: I never heard that.

Mr. DENISON: You have heard a great many complaints.

Witness: Yes, I have heard a great many; but that is one I never heard made. They practically consume less, because they are obliged to put on smaller burners, or the gas smokes. Gas of high illuminating power would smoke if it were burned from an ordinary burner—that is, a burner suitable to common gas. When gas of high illuminating power is used, a very much smaller burner must be used. The gas is usually delivered under a higher pressure.

Mr. DENISON: If that is so, besides the company losing by the alteration of price, they will sell less gas?

Witness: But they will not expend more capital; their works are large enough to go on for some years to come.

Mr. DENISON: Are you suggesting that the Imperial Company know so little about their business that they could save money by making 16-candle gas?

Witness: I do not suggest such a thing. I know what the company's operation is—it is far better for them to sell a large bulk of common gas than a small quantity of rich gas.

Mr. DENISON: That is the reason you think increasing their works is not convenient to the Imperial Company, to make two kinds of gas. Do you know of a company having raised the quality of their gas from 14 to 16 candles?

Witness: I do not know that I do.

Mr. DENISON: You have changed your mind since you gave evidence as to what was proper for London in 1866?

Witness: Yes; I think I have.

Mr. DENISON: I thought so.

Witness: I thought at that time gas of 14 sperm candles was enough; but now I do not think it is. I do not see why the metropolis should be worse off than a small provincial town.

Mr. DENISON: Have you changed your mind as to their not being able to earn 10 per cent. dividend upon what their capital was upon the price you suggested?

Witness: That was in reference to all the companies.

Mr. DENISON: No doubt it was. I will put it to you in this way: Do you think the Imperial Company could pay their dividend of 10 per cent., giving 16-candle gas at 3s. 9d.?

Witness: I really cannot tell.

Mr. DENISON: Surely that is a material question.

Witness: If the Imperial Company were to manage their affairs with great economy, perhaps they might; but the fact is that their working expenses are very large in comparison with other companies.

Mr. DENISON: What you mean to say is that, having come here to give this evidence, and having prepared that huge proof which is before my learned friend, you are not prepared to say whether the Imperial Company could keep up their statutable dividend of 10 per cent., with a price of 3s. 9d. for 16-candle gas?

Witness: Yes; I think they could, upon the footing that each candle cost them a halfpenny above 12 candles. If that be not so, I think they do not exercise good management; their working expenses are very much greater than any other company in London, except the Western and the Great Central. I do not consider that 14-candle gas delivered under penalties would be practically 15½ to 16 as manufactured upon the works. I consider that a company may keep free from penalties by making their gas so as not to exceed half a candle of the standard. The Western Company supplies only cannel gas, and that company habitually keeps within half a candle of the margin. The pressure is less where the works are close to or within the district of the company. But the illuminating power does not depend upon pressure, nor does the loss of illuminating power depend upon pressure. It depends rather upon condensation. The illuminating property in gas—the carbon—is deposited, in its passage through the pipes, by cold, and it is in that way more than any other that the illuminating power is lost. The tendency of all hydrogen gas is to resolve itself into water again. In order that a company may keep itself clear from the penalty for not providing 14-candle gas, they ought to produce on the works from 15 to 15½ candles.

By Sir J. DUCKWORTH: That would vary slightly, according to the length of main and the season of the year; they would be obliged to produce a higher illuminating power in the winter than in the summer.

Re-examined by Mr. CRIPPS: In Mr. Cardwell's report that calculation is put at a simple division of price per candle—that is to say, 4s. 6d. for 12 candles would be 4½d. per candle, although it does not follow that 4½d. is the actual cost of any particular candle, say after 12 or 14. It is a mere division for stating the comparison to the consumer. The way the 2½d. per candle is arrived at in the 3s. 9d. per 16 candles is that the committee took 2½d. instead of 2¾d. It has no relation whatever in applying it to the cost of the company for supplying an extra candle. In manufacturing gas with good Newcastle coal you must come up to 12 candles; the mode of calculation would not apply if you came down to 6. There is no limit in the Manchester Act as to the number of candles.

By Mr. CAWLEY: If a company sell 16-candle gas at 3s. 10d., they would not sell so much as if they sold 14-candle at 3s. 9d., and no doubt their object is to sell as much as they can, to get as large profit as they can. Assuming they did sell the same quantity, they would then be in the same position. Taking the ultimate result to the company, they would be in as good a position, getting 3s. 10d. for 16-candle, as they would 3s. 9d. for 14-candle, supposing the company start with 16-candle; but supposing they start with 14, and increase it to 16; I think they would not; but it is not only the company that has to be considered in this case, there is the consumer.

By Sir J. GRAY: The whole question is one of manufacture and distribution; smaller pipes will suffice for the distribution of 16-candle gas than for 14-candle, and there you would get a reduction of capital, and you would be able to pay your dividend on a smaller capital.

By the CHAIRMAN: The products arising from cannel are more valuable than those from common coal, as regards tar and ammoniacal liquor, but not as to coke, which is slightly less. The increase of the value would be in about the same proportion with the loss. When you come to very high illuminating power, there would be a loss as compared with common gas.

By Mr. DUFF: The Chartered raised their capital under the Act of last session to bear a dividend of 10 per cent. They have several different classes of capital. They applied to capitalize £360,000 of profits they had expended; the committee of last year refused them that power, but gave them 10 per cent. upon the new capital. According to the City Gas Act the price of gas is fixed at 3s. 9d., but that Act gives the commissioners power to raise as well as lower it. In the case of the Imperial there is no power to raise it.

Mr. RICHARDS: It was in clause 17, which has been struck out. It now stands that they cannot; but we know that my learned friend is going to bring up a number of clauses with reference to revision.

By Sir J. DUCKWORTH: I do not think that in the case of a company providing 16 instead of 14 candles the charge of a penny more would check consumption, but the higher illuminating power would cause a reduction in consumption. People would have to change their burners, which would have that effect, and therefore it would not be so good for the company. More light would be obtained for every 1000 feet, and therefore not so much in quantity would be required. If they became accustomed to better light they might continue it.

By Mr. CAWLEY: I know of no place where a reduction of consumption has followed an increase of illuminating power.

Samuel Hughes, Esq., examined by Mr. CRIPPS.

I know the district of the Imperial Company as compared with the Chartered. The former is a decidedly better district to supply than the latter. The Imperial is in one concentrated block, not broken up, whereas the Chartered is broken up into several districts separated from each other, with other companies districts intervening, and decidedly more disadvantageous to supply than the Imperial. Then with regard to the class of houses, I consider those on the greater part of the Imperial district of a very superior character, and likely to increase very much in their consumption of gas, whereas the Chartered district is one of limited extent; it contains no new country to be built over, and the probability is that the increase will be much greater in the Imperial district than in that of the Chartered. There is another matter which I think bears directly on the point. I find that the Imperial, taking the half year ending the 31st of December, 1868, has a rental, for every £1000 of authorized dividend, of £1467, whilst the Chartered has only a rental of £1419 for every £1000 dividend, and the City of London Company, for a corresponding amount of dividend, £1451; so that the Imperial is really better circumstanced by their last account than either of the other two companies. I think that goes to the point at once, because this is really the dividend which each of the three companies is authorized to pay.

The CHAIRMAN: We have had every word of this before. I think, Mr. Cripps, you may go on to the question of illuminating power.

Mr. CRIPPS: I hardly know how to separate that from this part of the question. A great part of the argument is that what has been done in reference to the Chartered should be done in reference to the Imperial. It is said on the other side that "the Chartered is no test, because our circumstances are not so favourable as those of the Chartered. The Chartered might be able to submit to a reduction which would not be fair to us."

By the CHAIRMAN: A great portion of the evidence before the committee previously was that the Chartered had been ruined by Mr. Cardwell's committee.

Mr. RICHARDS: It is not a comparison between this company and the Chartered. It stands upon its own merits.

Examination continued: Dividing the price paid by the number of candles represents the value to the consumer of his gas, but it does not represent in any sense the cost to the company of either increasing or lowering the illuminating power. The consumer derives more advantage from 14 than he does from 12-candle gas. The advantage is just in the ratio of 12 to 14. That is the value to the consumer, but the cost to the company is not the same. The cost to the company is very trifling on increased power. In the case of a company at present supplying 12-candle gas, and that company coming under the obligation to supply 16-candle, the extra cost of supplying the extra candles would be less than a halfpenny each. I have worked out the cost most accurately as between 12 and 16 candle gas, and find it amounts to 1½d. per 1000 for the whole 4 candles; therefore, something less than a halfpenny a candle. I am perfectly aware that that calculation is not what would be derived from simply calculating the product of each kind of coal, and the illuminating power it will produce. I speak from actual practice. I was employed, some time since, by the directors of some works, to report upon the quality of gas, and I found it 12 candles, they using a very excellent Newcastle coal. I reported that the gas was below the standard, and they immediately adopted the use of a small proportion of Wigan cannel coal. When I went down again I found that they were using 9 per cent. of Wigan cannel, and the quality of the gas was 15 candles; so that 3 per cent. of cannel raised the gas exactly 1 candle.

By Mr. CAWLEY: Nine per cent. was the whole quantity used, which is 3 per cent. per candle. I take it that 12 per cent. is to be used here to raise the gas 4 candles, and I can give the whole detailed calculation if you like.

By Mr. LOCKE: Three per cent. raises the quality 1 candle. I take the cost of producing ordinary 12-candle gas as made in 1866, because in that year there was a return given by the companies themselves, both of the gas sold and the coal used; therefore the dates of that year are more precise than for other years. In 1866 the products sold by the Imperial Company realized 6·78s., leaving 9·22s. for the cost of the raw material; that divided by 8 gives 1s. 2d. per 1000 feet, which is the net cost of making it for sale.

Mr. CAWLEY: You said "of making it for sale;" you do not mean that, do you?

Witness: I consider it the net cost of the gas, so far as raw material is concerned.

Mr. CAWLEY: Net cost of raw material?

Witness: Yes; the raw material is the only thing really to be compared. Then as to the cost of 16-candle gas—12 per cent. of Wigan cannel, at 24s., making 2·88s.; then 88 per cent. of Newcastle, at 16s., making 14·08s.: total, 16·96s. Then I take the yield of 12 per cent. of Wigan cannel, as by the accounts of the Western Gas Company, at 8530 feet per ton, 1024 feet; then the 88 per cent. of Newcastle coal, at 8000 feet per ton, 7040 feet; making a total of 8064 feet. That is a mixed quality of coal. Cost of raw material, 16·96s., less the products—12 per cent. of cannel, at 5·73s. per ton, as realized by the Western Gas Company, ·69s.; 88 per cent. of Newcastle coal, at 6·78s., as realized by the Imperial Company, 5·97s.: total, 6·66s.—and that makes the cost of the raw material 10·30s. Then dividing that by 8·064, I get 1·277, or 1s. 3¼d., as compared with the 1s. 2d., the cost from the Newcastle coal alone. The cost of the 16-candle gas from the mixed coal is 1·277s.

Sir J. GRAY: Is that the result of actual experiment—the result o any operations now going on—or is it simply your own calculation?

Witness: I am not describing an actual experiment now, but I have authority for all the figures from the workings of the different companies themselves.

Sir J. GRAY: You spoke of the return of a particular company, which you named; and I wished to know whether that was your own calculation or the result of actual operations.

Witness: The greater part of this is the result of the companies workings, taken from their own accounts; but, originally, it is based on my own experiments, that 3 per cent. of cannel will give one candle. The figures I have used are, to a certain extent, from inference.

By Mr. CRIPPS: I have applied what I found by experiment, in the first instance, to facts, and the actual working of the companies. The alteration of gas from 12 or 14 to 16 candle power would involve no new mains, because it is not supplying a distinct kind of gas, and the cost of sending it through the existing mains would be the same as with an inferior gas. There would be so little difference between 16 and 20-candle gas that people would not care to pay the higher price for the 20-candle.

Cross-examined by Mr. RICHARDS: I base my estimate of the quantity of cannel required upon an experiment of my own, which is being practically carried out with the whole supply of the Chertsey Gas Company. I am not the engineer of that company. I have a good deal to do with companies, but I am not the acting engineer for any one.

Mr. RICHARDS: Whenever there is a company to be attacked, you generally appear?

Witness: I dare say that is so.

Mr. RICHARDS: We have both had a good deal of experience in the matter, and I think it is so. You put down, as I understand, one candle as equal to three-eighths of a penny?

Witness: Yes—that is dividing 1½d. by 4; but I am willing to allow ½d. per candle. I wish to be liberal.

Mr. RICHARDS: What you have just told the committee with reference to

the calculations, &c., turns entirely upon the accuracy of that statement of yours, that the candle is worth three-eighths of a penny?

Witness: Yes; but this experiment was tested in a very particular manner. I have explained that I found the gas first at 12 candles, when made from an excellent variety of Newcastle coal. Then it was raised to 15, and I tested the quality myself to see that the charges were properly put in, and that everything connected with the distillation of the gas was maintained and perfect. I not only found that the 15-candle gas was maintained, but that the quantity of cannel was what I have stated in order to secure that. It was really a result which surprised me, and was not in my favour at the time, because I was trying the effect of bitumen mixed with coal. The experiment was made in the spring of last year. I do not know the per centage of cannel used by the Imperial Company at the present time. It would be very easy to ascertain the additional quantity they require to produce 16-candle gas. I think clause 55 of the City Gas Act of 1868 is perfectly right which gives power to substitute 14 or 15 candles for 16 as the minimum illuminating power for the year 1870, with a proportionate reduction of 2½d. per candle, because it is really the loss which the consumer would sustain by having his gas lowered. So far as he is concorned, it is correct, but the company would not save anything like 2½d. by the reduced illuminating power, and they would not think of reducing it to 14 or 15 candles, and cutting off 2½d. per 1000 feet. It is a fact, however, that they are to do so, if they reduce the illuminating power; but if they increase it above the standard in the Act, they are not to have anything like 2½d. additional. A provision is made for lowering, simply on account of loss to the consumer.

Mr. CAWLEY: The 2½d. clause appears to be doubly limited, as it can only come in with the consent of the corporation and the companies, and only applies to that particular year.

Mr. RICHARDS: 2½d. was agreed to on all hands to be the proper price.

Witness: There was a great deal of evidence given before Mr. Cardwell's committee to the effect that 1d. was a very high price.

Mr. RICHARDS: Given by you?

Witness: And others. At the Great Central arbitration the utmost claim was 1d. per 1000 feet for raising the illuminating power by one candle. It was a matter of dispute then whether it was not something between a ½d. and a 1d.

Mr. RICHARDS: 2½d. is treated in that clause as equivalent to a candle.

Witness: No; as equivalent to a candle in case of reduction, in order to compensate the consumer for the reduction, but not equivalent to a candle, either for raising or lowering, so far as the company is concerned.

Mr. RICHARDS: Clause 56 says: "On and after the 1st of January, 1870, the maximum price chargeable by any company shall be at such rate per 1000 cubic feet as for gas of the illuminating power supplied by that company will be proportional to the price of 3s. 9d. per 1000 cubic feet for 16-candle gas."

Witness: I take it that merely provides that the price per candle shall be the same for cannel gas as for common gas. That again is fair to the consumer.

Mr. RICHARDS: You compare the Chartered and the Imperial districts, and you say the Imperial is a much more favourable district. What is the rental per mile of main?

Witness: I really do not know, and I purposely abstained from learning, because I say it has nothing to do with it. I have heard the difference stated to be twice as much, but I do not know whether it is so or not.

Mr. RICHARDS: Does it strike you that a company which has £1600 rental per mile of main can supply cheaper than a company that has half that?

Witness: I say it is perfectly possible, because the Imperial mains in the outlying districts, towards the extreme verges of their district, are much smaller than in a district covered with houses like the Chartered district. The average size of the mains in the Chartered district is much larger than the Imperial. The rental per mile of main may be less in the Imperial, and yet the profit of the Chartered on the whole may be greater than in the Imperial. I do not know anything about the comparative sizes of the mains, but I give you a test which is far more valuable—the rental to pay each thousand pounds of actual dividend, which is a far more important test. The mains of the Imperial, I dare say, have to run far greater distances than those of the Chartered, but that has nothing to do with it.

Cross-examination continued: I do not think I have altered my views with regard to the illuminating standard for London since 1860. I have always been an advocate for a high illuminating power, because I know the advantage of it.

Mr. RICHARDS quoted from the witness's evidence on the Metropolis Gas Bill, 1860, to the effect that in his opinion 12 candles was a proper standard for the metropolis, but witness said he had no doubt that answer must be taken in connexion with something else. It meant to imply that the promoters were not asking for more than 12 candles.

The CHAIRMAN: Surely we have had sufficient evidence upon this. The witness, in 1860, thought 12 sperm candles was by no means too high for the metropolis, but he thought it was sufficient, and now he thinks that 16 candles is the proper standard.

Witness: Twelve candles at that time was rather a high standard than otherwise, but since then Parliament has more generally imposed 14 than 12 candles; the standard has been raised.

By Sir J. GRAY: At Chertsey they had been making the gas with the 9 per cent. of cannel for two or three months when I went down, and I continued the experiment myself for a week or ten days at least, and verified the result obtained. I confess that I was astonished to find that the gas had so much improved. That led me to the conclusion that 3 per cent. of the best Wigan cannel would add one candle to the illuminating power. Twelve per cent. would add four candles. I am not prepared to say that it would go on according to that law with regard to higher numbers. I can only speak up to 15 candles from actual experiment, but I have no doubt the others would be maintained in the same way. I have seen experiments by other engineers in which 18-candle gas was obtained from a very small mixture of Wigan cannel with Yorkshire coal. These were not laboratory experiments, but actual workings over a continuous period.

Mr. CRIPPS said he did not propose to call any other witnesses.

Mr. RICHARDS said he was prepared with evidence on behalf of the promoters if the committee thought it necessary.

The CHAIRMAN said if there was any evidence to rebut the statement as to the cost of the additional illuminating power the committee would hear it.

Mr. *John Field*, examined by Mr. RICHARDS.

I am the accountant of the Imperial Company. I have made an abstract of the accounts of the company as to the manufacture and sale of gas for the last three years, showing the total and the average. [Witness handed in the following table.]

Analysis of Working Accounts, 1866, 1867, *and* 1868, *showing Cost Price of Gas per* 1000 *Feet.*

	1866.		1867.		1868.		Total.	
Gas sold in the year (cubic feet).....	2,380,521,000		2,538,886,000		2,662,000,000		7,581,407,000	
Coals carbonized (tons).....	299,009		312,543		311,963		923,515	
Price to private consumers (per 1000 feet)	4/		4/		4/		4/	
Illuminating power (sperm candles)..	12		12		12		12	
	Total Cost.	Per 1000 feet.	Total Cost.	Per 1000 feet.	Total Cost.	Per 1000 feet.	Total Cost.	Per 1000 feet.
Coals.	£	d.	£	d.	£	d.	£	d.
Coal and cannel....	246,560	24·85	268,983	25·42	257,666	23·23	773,210	24·48
Less Residuals.....	99,884	10·07	111,952	10·57	99,905	9·00	311,742	9·87
Net cost of coal	146,676	14·78	157,031	14·85	157,761	14·23	461,468	14·61
Working Expenses.								
Manufacture and distribution	157,043	15·84	192,593	18·20	178,573	16·10	528,209	16·74
Management	25,898	2·61	27,921	2·63	26,931	2·43	80,750	2·54
Total working expenses	182,941	18·45	220,514	20·83	205,504	18·53	608,959	19·28
Net total, coals and working.....	329,617	33·23	377,545	35·68	363,265	32·76	1,070,427	33·89
Amount required to pay statutory dividend and interest.	160,995	16·23	174,897	16·54	182,272	16·43	518,166	16·39
	490,612	49·46	552,443	52·22	545,537	49·19	1,588,593	50·28
Receipts (except residuals deducted above)	482,803	48·67	514,479	48·63	538,774	48·58	1,536,057	48·62
Sum by which income is deficient in meeting statutory dividend and interest	7,809	·79	37,964	3·59	6,763	·61	52,536	1·66

In each of these years we have been compelled, in order to pay our statutory dividend, to draw upon the reserve-fund; in 1867 very heavily. In that year, through not getting the Act which the company applied for in the previous year, they had to pull down some works before they were worn out, and to reconstruct them, so as to make more gas. They had to pull down beds containing retorts of six, and erect beds containing ten retorts. We had to pull down these beds of retorts before they were thoroughly worn out. It was, therefore, an anticipatory charge upon our revenue account. Under ordinary circumstances, in converting beds of six retorts into beds of ten, we should charge to wear and tear so much as would be necessary to reinstate the sixes, and that which goes to the surplus of the ten would be a charge to capital, as being an extra source of produce.

The CHAIRMAN said the committee had already decided that the company should retain their reserve-fund, and it seemed to him that this evidence was rather re-opening that part of the case. It would be better to confine attention to the illuminating power.

Mr. RICHARDS said he would call the engineer on that point.

Sir J. GRAY (to witness): Under the head of "Coal," I see that coal and cannel are put together. Can you give us any information of the per centage of cannel used?

Witness: In 1866 we used 25,820 tons of cannel, and in 1867 we used 27,217 tons.

Mr. RICHARDS: Cannel of all sorts?

Witness: Yes; Boghead and the better sorts of cannel coal. In 1868 we used 16,959 tons of cannel.

Mr. RICHARDS: Having accurate acquaintance with the accounts, are you of opinion that the company can give the higher illuminating power of 16-candle gas at 3s. 9d., and make a profit equal to their dividend?

Witness: I am quite certain that they cannot.

Mr. RICHARDS: You have heard it stated that a penny per 1000 feet represents £10,000 a year. Do you confirm that?

Witness: Yes.

The CHAIRMAN: Do you consider that the price of the two additional candles would amount to what Mr. Hughes stated—£10,000?

Witness: Considerably more. The difference in the price of coals at different periods must be taken into account.

Cross-examined by Mr. CRIPPS: The ordinary coal consumed in 1868 was 295,004. The quantity of cannel in 1866 amounted to 8·6 per cent., n 1867 to 8·7 per cent., and in 1868 to 5·4 per cent.

Re-examined by Mr. RICHARDS: The per centage of cannel used in 1868 was less than in the previous years. I do not know to what extent the Boghead or richer Scotch cannels were used on any occasion.

Thomas N. Kirkham, Esq., examined by Mr. RICHARDS.

I am one of the engineers of the Imperial Company, and have been with them nearly 25 years, during which time I have had great experience in the manufacture of gas. I have gone into the matter of the value per candle when the illuminating power is raised from 12 to 16 candles, and I calculate the least cost at that range is 2·12d. per candle. I gave the same evidence in 1867, and then stated that the scale would run from 12 to 20 candles, at 2½d. per candle. It requires 40 per cent. of Wigan cannel to make 16-candle gas. To produce 16-candle to the consumers meters you must go beyond that at the works. You must take 8 cwts. of Wigan cannel, and that comes out to 10s. 9½d. There is greater expense in delivering 16-candle gas to the consumer than 12, because there is a greater amount of condensation. We get little or no condensation with 12-candle gas; there is a little with 14, and still more with 16, which is a loss to the company in illuminating power. When we use a larger proportion of cannel our residual products are deteriorated; some of them are of no use at all. The coke of the Boghead cannel is absolutely worthless, but the ammoniacal liquor, &c., is increased in value, but that is a very small matter compared with the coke. In my estimate I take 12 cwts. of Newcastle coal, making, at 16s., 9s. 7½d.; and the fuel to carbonize it, 12 bushels coke, at 3d., 3s. The total cost is £1 3s. 4½d., from which I deduct 7s. 6d. for the value of residuals, leaving 15s. 10½d. I estimate the quantity of gas per ton of coal at 9700 cubic feet, which gives the cost per 1000 feet of 16-candle gas 1s. 7½d., against 11½d. for 12-candle

gas. That leaves 8½d. as the cost of the extra 4 candles, or 2½d. each. If all the companies were compelled to produce 16-candle gas the price of cannel would be greatly enhanced. The Imperial Company upon all occasions consult every scientific man who may have a scheme for improving the manufacture of gas. The company work three stations, and they pit one engineer against another. A regular account is kept, one against the other, of the working of each station, so that the engineer who does not come up to the best standard has to explain it.

Cross-examined by Mr. CRIPPS: The residual product from the Wigan cannel is worth something like 5s. per chaldron in London. I believe the Western use cannel coal entirely. That company may get 10s. 3½d. per chaldron for cannel coke, but it is an isolated case. Their make of coke is small, and there is a large district to sell it in. Five per cent. of cannel, in proportion to the whole of our coal, materially affects the sale of our coke and the cost of fuel. Our make is so large we are at times obliged to sell our coke for anything we can get, not having the means of storeage. If we had a market for it all, I have no doubt we could get a different price. The average of our illuminating power in 1868 was a little over 14 candles.

By Mr. GREENWELL: We have a main running from Fulham to the Uxbridge Road, nearly three miles long, and we have not a single light on it. There is no doubt the 16-candle gas will deteriorate in its transit from Fulham to Marylebone. The 14-candle would also, but not in the same proportion as the 16. The difference between the Fulham works and the Marylebone supply would be about a candle and a half; so assuming the gas in Marylebone was 14-candle, it would be 15 at the works.

By the CHAIRMAN: The cost of making 14-candle gas is very nearly two-thirds of the price charged to the consumer.

Re-examined by Mr. RICHARDS: The parliamentary standard is 12 candles, but we work habitually up to 14. If we had to supply 16-candle gas, it would be necessary to work at Fulham station very nearly up to 18-candles. We put the loss of a candle and a half at about three miles from the works. The testing-place for the gas supplied from the Fulham works is in Marylebone. It is not put 1000 yards from the works, but upon the place where the consumers burn it, and there we stand or fall by the 12 candles. When the testing-place was originally arranged, the parish of Marylebone wished to have the gas tested where the consumer was to burn it; the company yielded to them, and it has been tested at the Marylebone Court House ever since. The testings, in some cases, show 15 candles. The object of the Imperial is to be safe against penalties.

By Sir J. GRAY: If we were using ordinary Newcastle coal, we should require to use 12½ per cent. of ordinary Wigan cannel to bring the illuminating power to 14 candles.

Thomas Greaves Barlow, Esq., examined by Mr. DENISON.

I am a gas engineer, and have been engaged for about 35 years in everything relating to gas-works. I am consulting engineer to the Dublin Gas Company. They are under a contract with the corporation to supply 16-candle gas; therefore I know pretty nearly what materials are required in its manufacture—viz., about 40 per cent. cannel equivalent to Wigan. Sometimes they use one sort, and sometimes another. I agree with the figures given by Mr. Kirkham, as to the cost of raising the illuminating power. In London we take it a fraction over 2d. a candle per 1000 feet for between 12 and 16 candles. The difference between each candle from 12 to 16, I make rather more than 2d. I have known the Imperial works since their establishment in 1824. I have had occasion to examine the working accounts of the company for rating purposes, and I have come to the conclusion that the works are admirably managed. I do not think they could be more economically managed with any kind of advantage. I have been a consumer of the Imperial Company's gas for some thirty years. I have a photometer, and make constant experiments as to illuminating power. If you wish to increase it beyond 16-candle power, the 2d. a candle will not hold good. At about 25 candles it might get to about 3d.

Cross-examined by Mr. CRIPPS: The per centage of cannel and other coal would of course depend somewhat upon the nature of the other coal. When I speak to the 40 per cent., the remaining 60 per cent., in the case of Dublin, is the very best Newcastle coal. A considerable quantity of Whitehaven coal goes to Dublin for household purposes; I am not aware that any of it is used for making gas. Whitehaven coal is inferior, of course, to Newcastle.

By Mr. LOCKE: The price of gas is 4s. 6d. in Dublin. It is only within the last two years that 16-candle gas has been produced there; 13 and 13½ was previously supplied. The company charged the same price, and paid 9 per cent. dividend. They now charge 4s. 6d. for 16-candle, and the dividend is reduced to 6 per cent.; last half year it was 7 per cent. The cost of Newcastle coals, delivered into the stores in Dublin, is about 16s. 6d. per ton, being about the same as in London. The cost of cannel is a little cheaper than in London—about 3s. 6d. a ton less.

By Mr. DUFF: It might be possible to get 16-candle gas with only 12 per cent. of cannel, if the richest description of Boghead was used.

By the CHAIRMAN: It is perfectly impossible to make it with that proportion of Wigan cannel only; 16-candle gas cannot be made with less than 40 per cent. of Wigan. In Dublin they make 3 or 4 million feet a day, I believe—about 900 millions a year.

TUESDAY, MAY 11.

William Innes, Esq., examined by Mr. RICHARDS.

For the last 24 years I have been the engineer of the Phœnix Gas Company, and have been much concerned in the whole of the gas inquiries which have taken place during the last few years. I have made experiments with reference to the use of cannel coal, and know the per centage necessary to produce a certain illuminating power of gas. I do not agree in the evidence given by Messrs. Hughes and Stevenson yesterday as to the cost of raising gas from 12 to 14 and from 14 to 16 candles. To produce from 13 to 14 candle gas it is necessary to use from 5 to 7½ per cent. of cannel, and to produce 16-candle gas 10 per cent. To supply 16-candle gas to the consumer it would be necessary to send out from the works gas of 17-candle illuminating power. If the best Newcastle coal were used in the manufacture, 15 per cent. of cannel must be employed; if ordinary second-class Newcastle is used, it will take 40 per cent. of Wigan cannel. It is almost impossible that every company should go to one colliery and get the very best coals. There is also the risk of deterioration from weather and storeage. If coals are kept for a considerable period depreciation from heat takes place. Six months ago I made experiments for the purpose of assuring my company that to supply 16-candle gas at 3s. 9d. would be a very serious matter to them. Those experiments were made not at all with reference to this case, but with reference to a proposed amalgamation of the companies on the south side of London. The result was to show that it would be so serious a tax to us that we should have lost our dividend altogether by the increased cost of manufacture.

By the CHAIRMAN: The additional cost of manufacture between 12-candle power and 16-candle power would be 2½d. per candle. I have never given evidence to the contrary effect. I have given evidence as to what increased price a contractor should have for raising 10-candle gas to 11 or 12 candles, he being paid 1s. 4½d. per 1000 for the manufacture, and the increased price to him would have been 1½d. to raise it from 10 to 12 candles. The difference is, therefore, in the expense of delivery, and the profit necessary to pay the shareholders.

By Mr. RICHARDS: As long as you keep from 5 to 7½ per cent. of cannel coal, 2½d. would be a fair remuneration for the increased illuminating power; but when you raise it to 16 or 18 candles, and employ a much more expensive quality of cannel, the cost rises considerably, and 3½d. per candle would represent the value per candle when you come to 18. In the Phœnix district we have two conditions of supply. In the borough of Southwark, which is very close and compact, a radius of three-quarters of a mile would enclose a gas-rental of upwards of £50,000. There the rental would be £25,000 a mile of main, and in Streatham, Clapham, and Lewisham from £700 or £800 a mile. We charge 3d. per 1000 cubic feet extra for gas supplied in the suburban districts.

Cross-examined by Mr. CRIPPS: The additional cost of increasing the illuminating power of the gas would arise to some extent from the diminished consumption. From the best Newcastle coal we can get 13-candle gas, producing 9500 feet per ton, and to supply 14-candle gas we should require to use in addition 5 to 7½ per cent. of cannel. To raise it to 15-candle gas would take about 8 or 9 per cent., and to raise it still higher 10 per cent. Our works are situated three-quarters of a mile from our gas-holder, and the diminution in quality there is found to be nearly 1 candle.

Re-examined by Mr. RICHARDS: The testing-place is fixed by the Act at 1000 yards from the works, and there the diminution in illuminating power is three-quarters of a candle.

By Mr. LOCKE: The amalgamation of the companies would be a considerable benefit to the consumers. The Imperial Company, which is capable of supplying one-fourth of London, might amalgamate the Independent and Western Companies. I do not think it premature for them to come to Parliament for an extension of capital before such amalgamation takes place, because they have exhausted their means of manufacture, and are working at considerable disadvantage. By amalgamation the price of gas might be reduced 1d. per 1000 cubic feet. The charges for directors and staff are the only charges that an amalgamation would materially affect.

By Mr. CAWLEY: The saving of 1d. per 1000 cubic feet by an amalgamation refers to the companies on the south side of London. A corresponding effect might be produced if all the companies in the metropolis were amalgamated; but I think the magnitude of the undertaking would be rather too serious.

Mr. RICHARDS said the return made to Parliament showed that directors fees stood at ·23d. per 1000 feet.

Sir J. DUCKWORTH: Then office expenses, and all that sort of thing, have to be added?

Mr. RICHARDS: Yes; management, of course—salaries, commissions, rents, rates and taxes, stationery, printing, and general charges. It amounts altogether to 1·93d.

Mr. CAWLEY: Exactly; and all that would not be affected by amalgamation, because there would be a more extended area.

Mr. RICHARDS: I do not know anything but directors allowances that would be affected.

Sir. J. DUCKWORTH: There would be the salaries of the secretaries.

Witness: And rents of offices; very little else.

Mr. GREENWELL addressed the committee, and asked, on behalf of the vestry of Marylebone, that a fixed price and a fixed illuminating power should be inserted in the bill, instead of a similar provision to that inserted in the City Gas Act, 1868. The vestry looked upon the latter as a provision very much to the detriment of the consumer, and they considered that they were entitled to receive gas from the company without regard to the amount of dividend they could pay. The parish of St. Marylebone was the first parish lighted by the Imperial Company in 1824, and they had gone through the inconveniences of high prices, from 15s. down to the present price of 4s. per 1000. They, therefore, thought that they ought not now to be subject to the speculative supply in suburban districts which had never paid those prices. If the 68th clause of the City Gas Act was applied to the parish, they would, in fact, be supplying the suburban and outlying districts out of the price which would go in reduction of dividend, and, therefore, in reduction of price. They required on that account a price that was not fluctuating, and they asked that it should be the lowest possible amount. He mentioned these matters at the present stage of the proceedings, because the Metropolitan Board of Works did not at all represent the parishes which took their supply of gas from the Imperial Company chiefly. There was no priority between them and the board in the matter of gas supply, and the parishes claimed to be heard on their own part.

Mr. COOPER said he did not propose to add anything to what Mr. Greenwell had stated, but he might say that he believed it was the unanimous opinion in Marylebone and Pancras that it was far better to have 14-candle gas at 3s. 9d., with a dividend of 7 per cent., than a dividend to the company of 10 per cent., with an increased illuminating power of gas to 16 candles, and a possible alteration in price from year to year. He might also mention that the parishes of Pancras, Marylebone, and Paddington consumed nearly one-half of the gas supplied by the company.

Mr. CRIPPS said he heard and paid great respect to anything which might be urged on behalf of the vestries, but, in point of fact, this was not a parochial matter, further than the supply of the public lamps in each parish was concerned. The districts of the gas companies were not conterminous with those of the parishes, and therefore it was not a matter which could be properly dealt with by the parishes separately. The Metropolitan Board, as representing all the parishes, came forward to put the matter before the committee as one of general interest.

Mr. GREENWELL said the Metropolitan Board represented the parishes in matters connected with the main drainage and sewerage, but not with reference to the supply of gas.

Mr. CRIPPS said the Imperial Company had certain powers under the Act of 1860 conferred upon them, but that Act did not give them any right or claim with respect to further powers which they might desire. When they came for those further powers the whole question was, of course, reopened, just as if the Act of 1860 had not passed; and the fifth resolution of Mr. Cardwell's committee stated "that the extensive powers asked for by the Chartered and Imperial Companies respectively in the bills now before the committee, are calculated to throw obstacles in the way of future competition, and the committee are not prepared to entertain them until the general system of supply shall have been placed upon a more satisfactory basis."

The CHAIRMAN said he did not like to interrupt the learned counsel, but Mr. Locke was anxious to call another witness.

Mr. RICHARDS objected, and hoped that, even though the suggestion came

from a member of the committee, such a deviation from the ordinary course of procedure would not be allowed.

The committee having consulted,

The CHAIRMAN said they had resolved to decline hearing another witness.

Mr. CRIPPS proceeded with his address, and, referring to the resolution of Mr. Cardwell's committee which he had just read, said the particular opportunity contemplated therein had now occurred, and if this committee parted with it, and gave the Imperial Company power to raise the money they sought, it was not likely that Parliament would have the chance of dealing with them for a very considerable length of time. He therefore intended, at the proper time, to ask the committee to impose upon them the terms embodied in the City Gas Act of last session, more especially those which bore upon the present question. The committee would remember that if these terms should prove too onerous, the company would have the power, at the end of any year, to obtain a review of the question, and an alteration of the illuminating power and price of the gas supplied by them. If the Board of Works was wrong and the company were right, the greatest possible evil they could suffer would be the diminution of their dividends for a single year, and even if such a diminution should take place, they would have the reserve-fund to fall back upon. The question which was raised on this point, and which, though not involving the whole of the matters in issue, was one of considerable importance, was the cost of manufacturing gas of the additional illuminating power beyond 14 candles. On the one hand, Mr. Hughes said he found from experiments that ½d. per candle represented the actual cost; on the other hand, Mr. Innes put it as high as 2d. Now, he (Mr. Cripps) could not help thinking that the estimate, in this latter case, was based upon an entire fallacy, because it included an additional charge for machinery and plant, as though in manufacturing gas of a higher illuminating power than 12 or 14 candles any extra expense was incurred beyond that of the material employed. The works were not required to be larger, the mains were not required to be different, nor was there any additional cost in connexion with the management or collection, nor in the incidental expenses, whether the company were supplying 14 or 16 candle gas. At the same time, he felt that it was an extremely difficult question for the committee to deal with. It was one which the commissioners could more satisfactorily dispose of, because they would have the opportunity of inspecting the works, calling for books and accounts, and, perhaps, of directing experiments to be made under their inspection. At any rate, there was that safeguard for the company that they could appeal to the commissioners, who could not be supposed in any way to be prejudiced, who would exercise a judicial power, and who would take every means of thoroughly going into the matter.

Mr. GREENWELL said he omitted to express the hope that the committee would fix the testing-place for the gas in the parish in which it was consumed.

Mr. CRIPPS said he should deprecate any departure from the provisions of the City Gas Act.

Mr. RICHARDS said the question of price and illuminating power, which was now before the committee, was in itself the gist and turning-point of the whole bill. The two things were inseparable in their nature, and had better be considered together. The South Metropolitan Company obtained 10 per cent. upon their capital, supplying 16-candle gas at 3s. 9d.; and, assuming the committee would deal out equal justice in the present case, he conceived that his clients, the Imperial Company, were in the following position:—"On the one hand, give 16-candle gas to the public, and take your dividend of 10 per cent.; on the other hand, limit yourself to 14 candles, and if you do so we will not give you more than 7 per cent." The 3 per cent. was, in round numbers, £30,000 a year; and could it be supposed that any body of men, like the Imperial Company directors, would submit to a loss of £30,000 interest upon their capital, if they did not think it was impossible they could supply 16-candle gas at 3s. 9d., as was asked by the opponents of the bill? He could not conceive a stronger proof of the *bona fides* of the promoters. There could not be a stronger proof of the sincerity of the directors, when they really agreed to a mulct of £30,000, rather than undertake that which they knew they could not perform. He, for one, did not hold that the Act of 1868 was a "model" bill, because its provisions caused constant fluctuations of price. Mr. Greenwell, for Marylebone, and Mr. Cooper, for St. Pancras, who were opposed to his bill, and came to assert their own interests, pointed out the extreme risk of fluctuating prices in their parishes, and stated they would rather have a fixed price, with fixed illuminating power, taking their chances of a reduction in price under the Gas Clauses Act, 1847, coupled with the assistance of the company's reserve-fund, than they would have the system of revision, which rendered fluctuation highly probable. Fluctuation was inconvenient to everybody; and, even if the Imperial Company were put under those terms, the other companies, who were under the Act of 1860, would be unaffected by the legislation of 1868. As far as probabilities might be guessed at, it was likely the Chartered Company might seek a revision in 1871. They could do so. That was the very year the forcible reduction of the Imperial Company to 3s. 9d. was to be imposed; and it seemed probable that, at the very period the Imperial were reduced to 3s. 9d., the Chartered might come for a revision, and obtain an increase of price to 4s. 6d. A penny per 1000 feet represented, as had been proved, £10,000 a year to the Imperial Company, and the committee had determined on a reduction of 3d., which involved £30,000 a year. Messrs. Hughes and Stevenson asserted that the two extra candles were only worth ½d. each; that was, the two candles would cost 1d., or £10,000 a year. Therefore £40,000 was taken off with the additional 3d. The Imperial Company required £140,000 to pay their prescribed dividend at 10 and 7 per cent., but if the £30,000 and £10,000 for the two candles were taken away it left them with £100,000 only. Other witnesses, on the other hand, put the candle at something over 2d. In that case it would cause £70,000 to come off the £140,000, leaving 5 per cent. to the company. The committee could not wonder, therefore, that the company should struggle so resolutely to prevent what would involve it in absolute ruin. With regard to the value of the candle, could any man with common candour, after reading the 55th section of the City Gas Act, come to any other conclusion than that the committee of last session contemplated 2½d. as representing the value of the candle in the range they were speaking of? Mr. Cardwell stated, on the recommittal of the bill, that the terms offered by the South Metropolitan of 3s. 4d. for 14 candles were just equivalent to the Chartered Company's 3s. 9d. for 16 candles. He meant by that, that 2½d. was last year throughout recognized as the proper sum representing the value of the candle at that range. Not only had he Mr. Cardwell's words, but practical men like Messrs. Kirkham, Barlow, and Innes had stated that, as the scale of the high range was ascended up to 18 candles, which the Imperial would have to give if called upon to supply 16-candle gas, 2d. fairly and properly represented the cost per candle. As the scale was ascended from 14 to 16 and 18 the expense per candle became greater and greater. Testings might be found in which the Imperial had occasionally supplied 14 or 15 candles, but that was when the gas had been distributed without losing that amount of illuminating power it was always liable to do. The company were obliged to produce a higher amount of illuminating power than the standard, in order to ensure being always equal to it, and if they were called upon to produce 16 candles they would really have to produce 18, and, the last 2 candles being so extremely expensive, he had no hesitation in saying the company would not be able to do it. Mr. Cripps had said that last year the Imperial burnt only 5 per cent. cannel, but he did not state that that included the rich Scotch cannel, such as Boghead and Lesmahago, which coals produced 10,000 or 11,000 feet of gas per ton of coal. Mr. Barlow's evidence showed that to do the thing in Dublin, where the cannel coal was as good, and the Durham equal to anything from Newcastle, 40 per cent. of cannel was positively put in, in order to produce 16-candle gas. At those works they were charging 4s. 6d., and their dividend was 7 per cent. With regard to amalgamation, that question was introduced for the purpose of showing that it was a simple mode by which the Imperial could supply gas at a cheaper rate, and therefore, under those circumstances, 3s. 9d. for 16-candle gas would be as good a remuneration as 4s. for 14-candle under the present system. The position of the Imperial contradicted that statement at once, lying as it did in a ring fence, and with no outlying or interlacing districts. They supplied one-fourth of the metropolis, and if there was one company out of the thirteen which ought not to amalgamate, it was the Imperial. He thanked the committee for their kind attention to him, and earnestly hoped they would not find it consistent with their duty to raise the illuminating power higher than 14 candles, as originally determined. He trusted, under those circumstances, the committee would do the company the justice to believe that, if they thought they could supply 16-candle gas, they would. Their desire was to give the best article they could at the lowest price, but they honestly thought it was impossible to do so at 3s. 9d., and they felt they could not do so.

The committee-room was cleared, and, on the counsel and parties being called in,

The CHAIRMAN said: I have to announce that the committee leave the illuminating power at 14 candles, and the price of gas, except cannel gas, will remain at 3s. 9d., as already fixed by the committee, to take effect upon the 1st of January, 1870, in lieu of 1871; and the committee will be prepared to insert provisions for periodical revision of price, illuminating power, and arbitration.

Mr. CRIPPS: That will be to adopt the City of London clauses for that purpose.

The CHAIRMAN: Yes; *mutatis mutandis*. You will be prepared with new clauses to-morrow, in consequence of these alterations.

Mr. GREENWELL: Can the price of 3s. 9d., which you have fixed, be increased?

The CHAIRMAN: Subject to revision and arbitration by commissioners to be appointed.

Mr. LOCKE: It may be decreased.

Mr. RICHARDS: You want it all your own way.

The CHAIRMAN: It may be increased as well as decreased.

WEDNESDAY, MAY 12.

Mr. CRIPPS said he wished to make a general observation in reference to clause 26, which might save some trouble, because it would also apply to several other clauses. It was said that that clause was, in effect, the same as the clause in the City of London Gas Act; but if it were *bonâ fide* intended to be the same, then why not have the identical clause in the same phraseology? If they did not assent to that, the probability, of course, would be that it was because there was something in the company's clause more favourable to them than the clause as it stood in the City of London Gas Act. Those two Acts would have from time to time to be interpreted by the courts, and there would be great difficulty in so doing if the two—though purporting to be same—were not expressed in the same language.

Mr. RICHARDS said there appeared to him no reason why they should adopt the particular form his learned friend pointed out. Certainly, the proposed clauses were much neater than those of his learned friend; but the fact was, the clause had been altered in conformity with the decision of the committee; and he asked whether it did not entirely carry out their views.

Sir J. DUCKWORTH: I should like to have heard from Mr. Cripps where the difficulty arises.

Mr. CRIPPS said that was to argue a question which hereafter might be argued before some court of law. He did not mean to say that he could not point out many probable differences, but he thought he ought not to do so.

Sir J. DUCKWORTH: I think it would be more satisfactory to the committee to have one or two pointed out.

Mr. CRIPPS said he thought it sufficient to say that differences would arise if they were not identical; and the very fact of asking to have the differences pointed out showed the likelihood.

Mr. GREENWELL requested an opportunity of being heard upon the principle of those clauses. The Board of Works objected to the words of the clause as proposed by the promoters, and his clients objected to the clause as proposed by the Board of Works. He wished to impress upon the committee that the cases of the City of London and the Imperial district were very different. The City of London was a small area where a large quantity of gas was consumed; but the Imperial district was a suburban district, and might be extended to Hornsey and other suburbs within the limits of the metropolis, and the committee would be guaranteeing to the shareholders 10 per cent. upon the old capital and 7 per cent. on the new; in fact, they would be expending their moneys in the suburban districts at the expense of the old parishes.

The CHAIRMAN said that matter was altogether irrelevant to the point they were then considering.

Mr. GREENWELL said he had been informed they were upon the point then, by reason of the 26th clause stating that the President of the Board of Trade might raise the price to any sum not exceeding that limited by the Metropolis Gas Act, 1860, or alter the standard of illuminating power within the limits thereinbefore prescribed. The gas for which they were at present paying 4s. might therefore be raised to 4s. 6d., because the committee were giving the company 7 per cent. upon the new capital—that was, whatever was laid out in the suburban district—which for many years could not realize any profit upon the outlay. He (Mr. Greenwell) would ask something different to that which the Board of Works were asking—viz., that, in consequence of the peculiar circumstances of the Imperial district, the clause should be modified by either stating that the maximum price ought not to be above 4s. (instead of 4s. 6d., which was the present price), or that the commissioners or Board of Trade should not be entitled to raise the price in the old district in consequence of circumstances connected with the new district.

Mr. DENISON said the only part of Mr. Greenwell's remarks which seemed to apply at present was what he said in the beginning, that he complained of the clause. When he (Mr. Denison) read the clause the other day he frequently paused, and nobody dissented. The only point of disagreement was whether

the illuminating power should be 14 or 16 candles. That point had been decided, and he did not see how the question could be reopened.

Mr. GREENWELL said it was the City of London clause that he was objecting to.

Mr. DENISON: You certainly said you objected to my clause.

The CHAIRMAN said the only point in dispute appeared to be whether the clause should remain in the bill, or whether clauses should be substituted in order to make the bill as much as possible like the City of London Gas Act.

Mr. GREENWELL said in the City of London Gas Act the price was to rise, after evidence before the commissioners, to 4s. 6d., if necessary to maintain a dividend of 10 and 7 per cent., but he saw no such clause in this bill.

Mr. DENISON said he could not see how that arose at present.

The CHAIRMAN said the committee were of opinion that it would be desirable to adopt the clause proposed by the Metropolitan Board of Works, in accordance with their decision of yesterday.

Clauses 31Q and 31 were read and passed with amendments.

Mr. RICHARDS said, in reference to clause 32A, it appeared that the company had for many years past appointed two auditors, who were re-elected every two years; and the suggestion now was, if the matter was put in the hands of a public auditor (and the Imperial Company would be perfectly satisfied if Mr. Parkes was appointed to investigate their affairs), and he had the power and pay, he ought to have also the responsibility; and, therefore, there was no reason for appointing two gentlemen to do the work, which would, in point of fact, be worth nothing, because all would depend upon whether the public auditor gave his sanction to the passing of the accounts.

The CHAIRMAN: Are you under any obligation by Act of Parliament to appoint two auditors?

Mr. RICHARDS: Yes, I think so, under the Companies Clauses Act; but, under the Imperial Gas Act of 1854, auditors are also appointed.

Mr. LOCKE: The question is, whether it is compulsory upon the company to do it or not, because, if they are not compelled to do it, there can be no necessity for these words.

Sir J. DUCKWORTH: Do you incorporate the Companies Clauses Act in your Act of 1854?

Mr. RICHARDS: Yes.

Sir J. DUCKWORTH: And, therefore, you have to elect auditors under the provisions of the Companies Clauses Act. As you do not incorporate that Act now, you say that the 101st clause still stands good against you under the powers of the original Act.

Mr. RICHARDS said he thought so; and it was at least questionable whether they should be compelled to pay two officers whose services became of no value at all.

Sir J. GRAY said it seemed that the policy of the Companies Clauses Act was to give the shareholders the opportunity of appointing their own auditors at a public meeting; and the policy of the present clause was to give that benefit to the consumers.

Mr. RICHARDS said that was so, and they did not take away the power of doing so if the shareholders wished it, but only to get rid of the compulsion.

Sir J. GRAY: What do you pay your auditors?

Mr. RICHARDS: I think it is £78 15s. half yearly.

Sir J. GRAY: It is hardly worth fighting about.

Mr. RICHARDS: The fact is, we are cut down so closely that every shilling becomes of consequence.

The CHAIRMAN: The committee seem to think that two auditors are better than one.

Mr. RICHARDS: We are prepared to let the matter stand as it is if there is any difficulty.

Clauses 32A, 32B, 32C, 32D, 33E, and 33F, were read, and passed with amendments.

Mr. RICHARDS said, with regard to clause 32G, he had some witnesses to call, because the company had no earthly desire but to supply what was a sufficient quantity of gas to their consumers, but the committee must be aware that any excessive pressure was not absolutely necessary for the supply to the consumers, and involved very great waste from leakage. With regard to the City, where the levels were tolerably uniform, it was not of so much importance; but in a district like that of the Imperial Company, where the levels varied extremely, the necessity of keeping a pressure so great as 1 inch at night and 3/5ths of an inch in the day all over the district, would involve a most enormous pressure. The pressure increased at the rate of 1 inch to every 100 feet, and if the committee insisted upon the lowest part of St. John's Wood having a pressure of 1 inch, that would represent 4 inches at Hampstead. No doubt Messrs. Hughes and Stevenson would prove that an inch was indispensable, but he would call witnesses who had the dealing with the company's consumers in the lower part of the district who would state that an inch was unnecessary, and therefore undesirable, because it involved unnecessary waste. Upon referring to the evidence of 1860, it was found that Dr. Letheby stated that the health of London was affected by escapes of gas, which would be increased if excessive pressure were put on. His proposal would be to leave the matter alone, his firm conviction being that the company had a sufficient interest in satisfying their customers; but if the committee insisted upon introducing pressure clauses—which seemed to be a crotchet in these latter days—he hoped they would not put in the high pressure asked for, his belief being that it was unnecessary.

Mr. *Thos. Hersey*, examined by Mr. RICHARDS.

I am chief inspector of the Imperial Gas Company, and have personal superintendence of the mains. Whenever there is evidence of insufficient pressure it is my duty to make such alterations in connexion with the mains as are likely to correct the evil. In supplying customers houses it is not necessary, in my judgment, to impose any such clause as that proposed at all. The ordinary desire of gas companies to supply as much gas as they can to their customers will always secure sufficient pressure for the customers good. Complaints are very unfrequent, but in the low parts of the district it is almost impossible to supply the pressure wished for. A pressure of 10/10ths from sunset to midnight in the lowest part of our district would be an excessive pressure over the whole of the other portions, which must cause a large amount of leakage, both to the company and the public. At Hampstead we should have a pressure of fully 3 inches to 35/10ths. I am quite sure that the advantage to be gained by this pressure of 10/10ths in the lowest district would not be equivalent to the disadvantage which would accrue from the extra pressure in other parts. Every complaint from a consumer comes direct to me, and is rectified. There is a penalty of £10 a day, supposing the company were not to give such a pressure in the lowest part of their district, which would amount to £3650 a year, if they had a daily penalty. That would be for each station, so that it would be a penalty of upwards of £10,000 a year for not giving that which I am certain is not required. The escape is in proportion to the pressure, and if you double the pressure you double the leakage. The whole of the Chartered supply is above the level of their works.

By the CHAIRMAN: I think the minimum pressure mentioned in the clause would be satisfactory at any time—6/10ths. There is no clause in our bill; it is in the City of London Bill probably.

Mr. LOCKE: You say it should be 6/10ths all round, day and night?

Witness: Yes. I would rather be without any excess, because I do not think it is required; but I think 6/10th is sufficient.

Cross-examined by Mr. WARD: I am acquainted with what are called street-governors, which are fitted to regulate the pressure of gas without difficulty. The pressure in the street on a public lamp has no affinity to the pressure going through a meter in a private house. A governor on the main would have the effect of reducing the pressure. Our difficulty is to get sufficient pressure at the low points of our district. The high pressure at Hampstead could be reduced by the use of the governor, but not to affect the pressure in the low points of the district.

Re-examined by Mr. RICHARDS: Street-governors regulate the supply of gas in the pipes, but they do not regulate the supply from the main. We have given satisfaction up to the present time without any clause of this sort, which was first introduced into the Chartered Bill of last year, I believe; I have not seen it in any other bill. We have returns of pressure every day from 50 or 60 places, and any deficiencies are remedied at once.

By Sir J. GRAY: We work at about 8/10ths on the average.

Re-examination resumed: When the works are in the low districts, and we have to supply districts extremely high, the rush of gas is enormous.

By Mr. DUFF: The lower the pressure at which gas can be burned the better the light.

Mr. LOCKE: If you do not have in these low places a particular pressure, you have no light; is it not the object of the clause that the gas shall be sent to those places?

Witness: That is the object, no doubt; but I may say the pressure required is excessive. The price of the governors is 3s. each. We have applied them to all our mains. Similar things could be applied to the houses.

Mr. RICHARDS: That is not where the leakage takes place.

By Sir J. DUCKWORTH: You cannot increase the pressure by a governor. The principal leakage arises from service-pipes and the mains, which saturates the roads; and, the lower the pressure at which we can work, the less saturation we have.

By Mr. RICHARDS: We have been endeavouring for many years to decrease the pressure, and in doing so we have decreased the leakage from 22 per cent. to 10 per cent.

Thomas G. Barlow, Esq., examined by Mr. RICHARDS.

I do not see any objection to the introduction of a pressure clause, provided it is a reasonable one. I should say that an ordinary fishtail burner requires from 5/10ths to 6/10ths of an inch properly to display its flame, and I think provision ought to be made so that you have sufficient pressure in the mains to answer that purpose. Other burners—such as Argand burners—will burn at a much less pressure—1/10th and 2/10ths. I think 10/10ths at any period would be objectionable. Of course I refer to the point where the supply will be the weakest—the low level. The Great Central works, for instance, are from 50 to 60 feet above Thames Street, and they have to keep a high pressure at the works to give them 5/10ths or 6/10ths at Thames Street. Looking at the Imperial district, and bearing in mind the fact that portions of the district are enormously higher than others, I would require 6/10ths between sunset and midnight, and 5/10ths between midnight and sunset. In my judgment, increase of pressure is objectionable, because it causes an increase in the leakage. In my own house, where I am supplied by the Imperial Company at a considerable elevation above the level of their works, I get 1½ inch pressure, and I have put up a governor to reduce it to 8/10ths. The luminiferous properties of gas are not properly developed under high pressure. If I burn 5 feet of gas under a pressure of 5/10ths of an inch, I get more light than if I burn it under a pressure of 1 inch. If burned at a high pressure, the luminous particles go off in smoke. Whatever the pressure be, a penalty amounting at each station (and there would now be four stations) to £3500 a year is enormous. It is not to the interest of the company to reduce the pressure below what will give a fair light, because if they reduce the pressure they diminish the consumption, and thereby diminish their rental. There may be points in the district where they run the pressure very fine, which they would not do under a £10 penalty; and therefore the pressure would have to be put on stronger, which would lead to enormous leakage in the higher parts.

Cross-examined by Mr. RODWELL: If you gain in light, you do not lose in heat. The pressure has nothing to do with heat, except in producing a larger consumption. A kettle of water would boil more quickly with a high pressure of gas than with a low pressure, but you might be burning double the quantity of gas. The consumer would have a tap under his own control, and can regulate the quantity to whatever he likes. If he attempted to burn a large quantity of gas under a high pressure smoke would be deposited upon the bottom of the kettle, which would be the unconsumed gas.

By Sir J. GRAY: Excessive pressure is injurious to the consumer, because he cannot be always looking after the burner taps.

Re-examined by Mr. RICHARDS: The loss occasioned by the leakage would go to increase the cost of gas.

By Sir J. DUCKWORTH: I cannot give the same pressure in a level district that I should to any district in which the variations were considerable in point of level. Of course, any one wanting to see whether the company did their duty would fix the pressure-gauge in the lowest level. In the case of the Great Central works it is necessary to keep up something like a 3-inch pressure to get 1 inch pressure in Thames Street.

By Sir J. GRAY: Thames Street is about 50 feet below the level, but there is a large intermediate consumption between the works and Thames Street. They have two trunk mains, but both are common mains. There are no means of separating the high district from the low.

By Mr. RICHARDS: In Dublin there are six mains supplying different districts of the town, and, if I recollect right, the maximum pressure on any one of those mains is about 3 inches, and with that they get 7/10ths or 8/10ths at the weakest point.

Mr. *S. Hughes*, examined by Mr. RODWELL.

I have always contended, in the interest of the consumer, that the pressure should never fall below an inch. If a consumer has gas supplied at a higher pressure than is convenient for him to burn it at, he can in a very simple manner reduce the pressure by means of the tap on the service-pipe. I am willing to admit that, if a consumer is wasteful and indifferent, he may have his gas wasted by excessive pressure, and he would have to pay for his wastefulness. The mere hissing of the gas would warn him that the pressure was too high. It is for cooking purposes that I chiefly insist upon pressure. In using the inferior gas from common coal in London you cannot get a proper flame without mixing it with atmospheric air, and if gas is supplied at a low pressure, the proper cooking-stove for combining atmospheric air with gas will not act. The use of gas for cooking purposes is on the increase, but supplying gas at a low pressure will interfere with it most materially.

Cross-examined by Mr. RICHARDS: There is nothing in the Imperial district like what prevails in the Western district, where the works are 60 feet above St. James's parish, and the gas is sent down at a high pressure, and no complaints are heard of. If the Imperial Company are compelled to supply at a high pressure at the lower part of St. John's Wood, the pressure would be enormously high at Hampstead, unless they regulate by street-governors, which is quite a common plan. To supply an inch pressure at St. John's Wood, would require, I should think, an initial pressure of 2 to 3 inches at the works at Fulham. The leakage will not be materially increased by raising the pressure if the mains are in perfect condition.

By Sir J. DUCKWORTH: If you stop the pressure beyond the governor, I do not think you increase the pressure behind the governor, because the governor is introduced to prevent the pressure going to an elevation beyond it.

By Sir J. GRAY: If you have a pipe 20 feet long from the main, and you open an inch pipe, you decrease, no doubt, the pressure along the whole line of that pipe.

Mr. RICHARDS said the company would be perfectly willing to accept the pressure Mr. Barlow had mentioned. Although it was very easy to say there was nothing simpler than to put in a governor, when they came to deal with districts varying enormously in level, going up and down, the difficulties were very great. If additional pressure were put on, leakage would, undoubtedly, be increased, and for the good of no human being.

The room was then cleared; and, on the parties being readmitted,

The CHAIRMAN said the committee had amended the clause by striking out the word "one," and inserting in lieu thereof "8/10ths of an," and had passed the clause.

Clauses 32H, 32I, 32K, 32L, 32M, 32N, 32O, and 32P, were passed with amendments.

Mr. RODWELL said, with reference to clause 25, that the question then arose whether the Metropolitan Board of Works were to have the power of appointing examiners, exercising control over the gas companies in what might be termed a uniform method, or whether the local authorities were to have that power. It was very material that there should be as much as possible unformity; but if the different vestries, 37 in number—11 of them in the Imperial district alone—were to have a voice in the matter, and to appoint examiners to test the illuminating power, there would possibly be some differences in the results of their testings. He suggested that the matter should be left to the Metropolitan Board of Works, who were recognized in Acts of Parliament themselves as the proper parties. [The learned counsel quoted from Chartered Company's Acts and from the City Gas Act of last session in support of his views.] He thought the committee would be of opinion that it would be far better for the Metropolitan Board to appoint one, two, or even three competent persons whose reports and experiments would be satisfactory to the referees. The Metropolitan Board was merely the representative body of those various vestries.

Mr. GREENWELL: Not in matters connected with gas.

The CHAIRMAN: Do the vestries object to your being a motive power? Is not their objection that they are not allowed to be a motive power as well as yourselves?

Mr. RODWELL: I presume the real fact is that they wish to keep the power in their own hands, and not delegate it to others.

Mr. RICHARDS: We watch this little fight with great interest. We do not care which way it goes, but we do not wish to have two masters.

Mr. RODWELL said he thought his learned friends appearing for the Imperial Company were in favour of having as few persons to meddle with the matter as possible. That was a matter to which the Metropolitan Board attached considerable importance. He suggested that the principle of placing the power connected with gas in the hands of the Metropolitan Board having been adopted so deliberately by the Legislature, the onus rested upon those who objected to show that there ought to be an exception.

The CHAIRMAN said the committee were of the same opinion.

Mr. *Thos. Keates* was called, and, in reply to Mr. GREENWELL, said he was appointed gas examiner to the Metropolitan Board of Works on the 19th of March, but he had never tested the gas of the Imperial Company.

Mr. COOPER said his clients had exercised their power faithfully, honestly, and straightforwardly, and he was prepared to show that the Imperial Company was altogether different from the Chartered Company. The latter company were divided into two parts, one in the City and the other in the metropolis; and in reference to the part in the City, the corporation had the power of appointing a gas examiner. The parishes of St. Pancras and Marylebone presented a petition against that clause in the case of the Chartered Company, but they were not allowed to be heard. From 1860 down to the present time the vestries had appointed skilled examiners such as anybody would be proud to have, and why the Metropolitan Board should now come in for the purpose of taking away that power he could not conceive.

Dr. *Thomas Stevenson*, examined by Mr. COOPER.

On the death of Dr. Hillier, in December last, I was appointed gas examiner for the parish of St. Pancras, and have tested the gas under the 27th section of the Metropolis Gas Act. I have never been interfered with by the vestry or any other body, and I have had no complaints from the consumers. On one occasion the gas was as low as 12 candles, but the average has been slightly over 14 candles—rarely falling below 13. A new testing-place has been fitted up for me in order that my operations may be carried out to a larger extent. I believe the parish would be extremely unwilling that the examination should fall into the hands of any one else—especially the Metropolitan Board of Works.

Cross-examined by Mr. RODWELL: I cannot say how many testers are necessary for the whole of the Imperial district. Excluding the sulphur test, it takes me from about half an hour to three-quarters of an hour for each test. I examine the gas three times a week, selecting various times in the day, according to my own discretion. I think an examiner of gas would be necessary for every large parish.

Re-examined by Mr. COOPER: When I perform the sulphur test it occupies considerably more time—sometimes three or four hours, and sometimes longer.

By Sir J. DUCKWORTH: The vestry think that if the testing were in the hands of the Metropolitan Board there would be jobbery going on. Another objection is that the testings would really be deputed to assistants, in the same way as is done under the City of London Gas Act, and these assistants may either be good men or they may be very inferior gas examiners.

By Mr. RODWELL: I am aware that the examiner is to give his personal superintendence, and visit one testing-place every evening, but he is not obliged to be at every testing-place each evening.

Mr. COOPER said he could, if necessary, prove that out of £531,760 rental of the Imperial Company, £115,195 is paid by St. Pancras, £93,510 by St. Marylebone, and nearly £50,000 by Paddington.

The CHAIRMAN said he did not suppose that would be disputed.

Mr. *Hersey* recalled, and examined by Mr. COOPER.

The parish of St. Pancras test the gas from the King's Cross works, and the Marylebone test from the Fulham works. Examiners are also appointed by the Hackney Board of Works and Bethnal Green. The St. Pancras and Marylebone tests very much agree with our own, and I do not think they could be done better than they are by Drs. Whitmore and Stevenson.

Cross-examined by Mr. RODWELL: I think a person coming occasionally, the company not knowing when he is coming, is quite as formidable as a person examining three times a day.

Mr. GREENWELL asked the committee not to repeal the Act of 1860 in respect of the parishes who had carried out the provisions of the Act in respect to appointing gas testers. Those parishes had an apprehension that the Metropolitan Board obtaining a control over gas matters would ultimately effect the object—which had been put forward on other occasions—of purchasing the works of the gas companies, and carrying on the sale and manufacture of gas at the expense of the public rates. The committee had fixed the illuminating power at 14 candles, but he had still to ask that it should not be the illuminating power 1000 yards from the works, as it would be if the clauses of the Metropolitan Board of Works were substituted for the clauses of 1860, but that it should be the illuminationg power of 14 candles in the parish where it was supplied. The testing was done at present by a gentleman who had his office in the middle of the parish, but if the power was transferred to the Metropolitan Board, it would be tested by a gentleman four miles away from the parish, in some office in Fulham, only to be got by a roundabout process through an office in Spring Gardens. His clients had hitherto performed their duties to the best of their ability, and were prepared to do so for the future in any way that might be prescribed. They were quite willing that their examiner should be subject to the direction of the referees and chief gas examiner, but they did think they were entitled to retain the powers that were given to them in 1860. There was a very large principle at stake. It was not the mere question of testing, but it involved the whole question of local government. Was it any encouragement to local boards to carry out the powers given to them by the Legislature, if, when they had carried them out, they were in a few years afterwards to have them taken away again?

Dr. *John Whitmore*, examined by Mr. GREENWELL.

I am medical officer of health and chemical examiner of gas in the parish of Marylebone. My duty is to test the illuminating power of the Imperial Company's gas, the amount of sulphur and ammonia contained in the gas, and the presence or otherwise of sulphuretted hydrogen. I have also to register the pressure of the gas during the 24 hours in each day. The testings for illuminating power are made two or three times in each day—most frequently at the period when there is the greatest consumption. I test the gas by Bunsen's improved photometer; I also use Dr. Letheby's sulphur test, and an oxalic acid test for ammonia. There are ten observations of the photometer one in every minute. The results of those testings are published every month. I have occasionally found a deficiency in the illuminating power, and have first communicated the fact to the vestry, and then to the secretary of the company; or, if there has been an excess of impurity, I have called his attention to the fact, and I have always received a polite reply stating that my communication would be attended to, and where there has been any mistake it has been promptly corrected. I am sure the result of the testings has been beneficial to the parish of Marylebone. I I believe I am correct in saying that the Imperial Company have sent out better gas than almost any other gas company in London. I test the gas in Marylebone Lane, and I almost invariably find that the illuminating power is above the standard as prescribed by the Act of 1860.

Cross-examined by Mr. RODWELL: I am aware that by the Act I ought to test the gas at some place 1000 yards from the works, but I think it is objectionable to do so; it ought to be tested in the locality where it is consumed.

Mr. RODWELL: Do you not know it is in direct contravention of the Act of Parliament? How would you enforce penalties?

Mr. GREENWELL said the company agreed with the vestry that the testing-place should be in Marylebone Lane, and that they would be subject to all the penalties prescribed by the Act of 1860.

Mr. RICHARDS (to witness): Now that the company are put upon a higher illuminating power, does it strike you as reasonable that any difference should be made between them and the Chartered Company, who are under the same terms—testing at 1000 yards—they supplying the gas seven miles from their works? Do you think it reasonable that the Imperial Company's gas should be tested under this new Act up at Marylebone, instead of 1000 yards, as the Chartered are?

Witness: Probably not.

Mr. RODWELL said it was quite possible, if the power were placed in the hands of the Metropolitan Board, that those gentlemen who had proved themselves so efficient might be the very persons appointed by the Board of Works, who came forward only on the principle that it was better to have one master than so many. The two gentlemen who had been examined had shown there would be variation in the mode of testing, which would lead to mischief, one gentleman considering it enough to devote three-quarters of an hour three times a week to those duties, and the other devoting much more time, because he thought less time would not enable him to form a proper opinion, or to arrive at a proper test.

The committee-room was again cleared, and on readmission,

The CHAIRMAN said the committee had passed clause 17A, with an alteration. They had struck out the word "two," and inserted "one."

Clause 25A was passed, with amendments.

Clause 25B was struck out.

Mr. GREENWELL said he had a word to say respecting clause 25C, with reference to the fixing of the illuminating power lower or the price higher than was prescribed by the Act of 1860. The Imperial district was very different to that of the City. The latter was a small area taking a large consumption of gas to every part, whereas the Imperial was a suburban district, and the operation of the clause would be that in the outlying and thinly populated districts the company would be extending their new capital, and it would be several years before they would be able to recoup themselves the 7 per cent. authorized upon that capital, and in the meantime the outlying districts would be lighted at the expense of the consumers in the old district. The clause practically gave to the company a guarantee-fund of £90,000—which was the difference between the present price and 4s. 6d. which they were authorized to raise it to; so that in the course of two years, instead of getting the benefit of a low price, the price to the consumers in the old district might be raised to 4s. 6d., which was 6d. above the present price. As the circumstances were so different in the two districts, he would ask the committee to make some such provision as that the commissioners should take into account the loss arising from the outlay on mains and the supply of gas to places not supplied by the company at the date of the present Act, and unless the supply in those districts should have returned a profit of 7 per

cent. upon the outlay in such districts, such outlay should be excluded from the consideration of the commissioners. If the committee thought that too complicated, he would ask that the maximum price should be 4s. instead of 4s. 6d., as in the Act of 1860, so that the company could not raise the price above 4s. at the time of revision.

THURSDAY, MAY 13.

Mr. RICHARDS referred to clause 25G, which ran thus: "If on any day the gas supplied by the company from any station is of less illuminating power than it ought to be under this Act, the company shall forfeit a sum equal to the value of the defective power, estimated at the rate of 20s. for every half candle of defective power, on every 100,000 cubic feet, or any fractional part less than 100,000 feet of gas made at that station on the day of default." He said the words "made at" should be "delivered from," because to pay a penalty upon gas in store was absurd.

The CHAIRMAN did not think that was the meaning of the framers of the clause.

Mr. RICHARDS said that a clause of that kind was a very serious thing to a company like the Imperial, dealing with the quantities they did. Their Fulham station alone sent out in a day 6 million cubic feet, and they would upon this clause be liable for 1 candle to pay a penalty of £120 a day. He would call a gentleman with the most practised eye, who would tell them that to put a penalty upon a standard ranging by half a candle was too fine.

The CHAIRMAN: If we take your clause, there is still the defence of the decimal point—no fine if you give the full illuminating power; but supposing it to be ·99, the penalty will be incurred.

James Glaisher, Esq., examined by Mr. RICHARDS.

I am a Fellow of the Royal Society, and superintendent of the Magnetic and Meteorological Department of the Observatory at Greenwich. I have had experience in examining the illuminating power of gas for upwards of twenty years. In my department we have in one room six or seven gas-lights devoted to the purpose of self-registration of the most delicate instruments in magnetism; also instruments connected with the temperature and humidity of the atmosphere, and the consequence is that any variation in the illuminating power is made immediately evident to myself. The Phœnix Gas Company, many years ago, placed their testing apparatus at the works and elsewhere at my disposal, so that without notice I might test their recorded illuminating power with the results at the Greenwich Observatory. I have a trained eye for the most minute observations, but I have never been enabled, though taking every precaution in a series of experiments, to get them all within one half candle, and I do not think there is any photometer at the present moment, or any arrangement that the most careful observer can make, which will enable him to be so accurate.

Mr. RICHARDS: Do you know anything as regards the candles? Must you take the greatest pains to get a correct candle, so that they can be thoroughly relied upon?

Witness: I think not; but there are various reasons for that, because the chamber in which the candle is placed becomes heated at the end of the experiment, if it is long continued, and it is not under the same circumstances as it was at the beginning.

Mr. CRIPPS had no questions to ask this witness, but had an observation to make on the proposition. The question of illuminating power had been decided by the committee in favour of the company. What he wished to put to the committee was, whether the effect of putting a candle there instead of a half candle would not be to lower the illuminating power from 14 to 13 candle gas, because so long as the company supplied 13-candle gas they would not be liable to the penalty. His learned friend was wrong in the reading of that section. It was not a penalty per candle, but per half candle, so that it would limit the penalty to a half, as was prescribed by the Act. It was a clause that was fully considered in the City Gas Act, and was metropolitan law at the present time.

Mr. RICHARDS remarked that the question was not gone into with any degree of delicacy.

The CHAIRMAN said: The committee are unanimous against you, Mr. Richards; they retain the clause as it is, inserting the words "delivered from," instead of "made at." The decision is with reference to the half candle.

Mr. RICHARDS observed that the company were liable to a penalty of 20s. for every 100,000 feet delivered from any one station, and he submitted that to impose a penalty of such enormous magnitude was something quite crushing to them.

Mr. LOCKE said clause 25I explained the present clause, showing the evil must be wilfully done for the company to be liable to a penalty.

Mr. CRIPPS submitted that the penalty should be proportionally large with the supply, because any failure in this company would do far greater mischief than in a small company like the Chartered.

The CHAIRMAN said the committee were of opinion that the company ought to keep well above the standard of 14 candles. Others were forced to increase their illuminating power to 16, and they (the committee) thought that no risk ought to be run by falling even one below the power of 14 candles.

Mr. RICHARDS asked if the clause was passed, and the words "20s." remain.

The CHAIRMAN: Is the committee to understand that you, Mr. Cripps, consider that there should be a fine of 20s. for any deficiency below 14-candle power?

Mr. CRIPPS said he did not read the clause so. He considered no fine should accrue unless the deficiency was below half a candle.

The CHAIRMAN: The committee have struck out the words "made at," and inserted "delivered from," and pass the clause as it stands.

Mr. RICHARDS said he now came to clause 25C, which was a very important one, as to revision, since the committee had decided to make the reduction in 1870, before the company had erected one single portion of their works; it was, therefore, unavoidable that the reserve-fund must be drawn upon in 1870, to make up the dividend. That fund, being £37,000, would in all probability be exhausted. There was the £30,000 due in reduction of price, there was £10,000 due to the extra 2 candles, and then against that might be put some extension of business. Call it, therefore, in round numbers, £30,000; and besides that there was capital to be spent upon the new works. They could not borrow any money until they had raised capital, and, therefore, the company must raise the capital at 7 per cent.—*ergo*, there would be the interest upon the money expended upon the new works at that time unprofitable. Consequently, it appeared to him that in 1871 the reserve-fund of £37,000 would be exhausted, and in all human probability the company would have to come for revision. He really was waiting to hear his friend's objection to the first part of this clause, which stood thus: "They shall fix such an illuminating power and such a price as shall be calculated to yield to the company, with due care and management, such dividends as are reserved to them under this Act, and also to make up the reserve-fund which is substituted for the original insurance-fund, as applicable to the City gas companies."

The CHAIRMAN: You have got £50,000 reserve-fund.

Mr. RICHARDS said the reserve-fund as it stood at present was £37,000; the £50,000 given in evidence must have been as it stood prior to 1869. The contingency-fund was £38,792 16s.

Section 1 of clause 25A was read, and passed with amendments.

Mr. RICHARDS said he had an observation to make with regard to section 2 of the same clause. It ran thus: "The commissioners shall take into account any saving or economy which they shall be of opinion might be effected by amalgamation of the company with any other company." He had never heard such an extraordinary provision as that. He would meet the question on its merits. In the bill of last year, operating as it did upon the Chartered Company, it became essential that there should be a power by which the two other companies, if they thought it desirable, might amalgamate, and in that case it was well introduced. They could submit a scheme to the Board of Trade which, put into operation by the board, would become binding upon the other companies. In the bill of last year there was a scheme for amalgamation, on which section 2 of the clause might operate. Here there was no such scheme, and he would ask what possible application it could have in the present bill.

Mr. CRIPPS said he thought his learned friend misapprehended the meaning of the clause. The committee would observe that something was to be done with reference to those companies at some future time, but the commissioners, who were supposed to be appointed as impartially as possible, were to consider the whole matter. The matter was not left entirely open to those commissioners, but it was proposed to give certain instructions to them as to what they were to take into consideration in any revision, therefore justifying section 2 of the clause, which was left to the discretion of the company.

After further discussion, the committee-room was cleared, and, on the counsel and parties being called in,

The CHAIRMAN announced that the committee had struck out section 2 of clause 25C.

Mr. COOPER said, with reference to section 3 of clause 25C, that under the 40th section of the Act of 1860 the company might run up the price to 5s. 6d., and he wanted a limit of 4s. 6d. put in.

Mr. RICHARDS: Mr. Cooper wants to set aside the model bill.

Mr. COOPER: Yes; I say it was passed *per incuriam*.

Mr. RICHARDS said that what Mr. Cooper wanted was any amount of revision for cutting the company down, but not so when the company wanted their price put up.

The CHAIRMAN: I suppose you would be nearly ruined before the commissioners, probably, would raise your price above 4s. 6d.

Mr. RICHARDS said the company would be naturally in a pressed state before they would go for a revision at all, and the commissioners had it entirely in their hands as to how they should raise it. In case of a war with America, for instance, the price of coals in London would be raised enormously.

Mr. COOPER: I have only called the attention of the committee to it, and if they say there shall be no alteration I am content.

Sir J. DUCKWORTH: The commissioners would never do it, except under very exceptional circumstances.

Section 3 of clause 25C was read, and passed.

Mr. RICHARDS said, in reference to clause 25D, as to costs of revision, he thought the terms laid down were somewhat unreasonable. He proposed the following:—"The costs of every such application shall be in the discretion of the commissioners, who shall have power to direct payment thereof out of any funds belonging to the company, or to the Metropolitan Board of Works, as they may think fit"—that was to say, that the gentlemen in whose hands was reposed all the power and discretion in reference to the matter should not have their hands tied at the last moment, but should be able to say this party or that should pay the costs, and apportion the costs as they thought the equity demanded.

Mr. CRIPPS said he was quite content with the clause as it stood.

The CHAIRMAN: The committee are unanimous in rejecting your new clause, and think it desirable to adopt this clause as it stands in the City Gas Act.

Clauses 25D and 25E were read, and passed with amendments.

The remaining clauses of the bill and manuscript clauses were read, and passed with amendments.

The chairman was directed to report this bill, as amended, to the House.

Miscellaneous News.

REPLY OF THE GAS REFEREES TO THE REPORT OF MR. C. HEISCH, GAS EXAMINER OF THE CITY OF LONDON.

To R. G. W. Herbert, Esq., Railway and Gas Department, Board of Trade.

Sir,—The JOURNAL OF GAS LIGHTING publishes a report which Mr. C. Heisch has addressed to the corporation of London, in which he takes exception to some points of the instructions lately issued by the referees; a copy of that report has also been sent to you. Under these circumstances, and as Mr. Heisch is one of the gas examiners, the referees beg to make the following remarks, in order that the true character of the document may be made apparent.

Mr. Heisch's first objection is, that the period during which the gas is to be tested for illuminating power is not long enough. In their instructions for the summer months (upon which Mr. Heisch comments), the referees enjoin that these testings shall extend over three hours, from 8 to 11 p.m.—and this is the entire period during which such testings are permitted by the Act of 1868. The referees could not possibly have either lengthened the duration of these testings or increased their frequency.

In their instructions for the past winter months (which never came into force, owing to the manufacturers having been unable to complete the testing-stations within that period), the referees enjoined that the testings for illuminating power should extend over four hours, out of the entire period of five hours during which such testings are permitted by the Act—these four hours (from 5 to 9 p.m.) being, moreover, those when the largest consumption of gas takes place. As the referees believed that such a duration of the testings is sufficient to protect the interests of the public, they did not feel justified in prolonging them, and thereby causing additional expense to the municipal bodies in the shape of salaries to the persons employed in the testing-stations.

As to "the puff of cannel," by which Mr. Heisch thinks that inferior gas would be suddenly brought up to the full illuminating power during each ten minutes of testing—thereafter as suddenly ceasing—if he had any acquaintance with the manufacture and distribution of gas, he would have been aware that such an operation would be so liable to detection that none

of the companies which are placed under the Act of 1868 would think of attempting it. It could only be effected by means which would be detected by the referees in their recurrent inspections of the gas-works and investigations of the processes of manufacture there in use. Moreover, a daily fraud of this kind could not be committed except with the knowledge of labourers in the works; so that the gas companies would be as sure of detection as any man would be who should mount at noonday to deface the statues in Trafalgar Square.

In the next objection which he takes to the instructions, Mr. Heisch represents the matter to the corporation as an act, on the part of the referees, of injustice to the public and of partiality to the gas companies. The referees, however, content themselves with stating the facts which demonstrate the deficiency of Mr. Heisch's knowledge of the matter.

In all scientific testings of gas, whether for illuminating power or for purity, it is usual to correct the quantity of gas (registered by the meters) by reference to the temperature and the atmospheric pressure indicated by the barometer. Under the Act of 1868 it is of the utmost importance, in the interests alike of the companies and the public, that every precaution should be taken to secure strict accuracy in the testings, and leave no ground on either side for demurring to the reports of the gas examiners, if approved on appeal by the chief gas examiner. Accordingly the referees have appended to their instructions a table, by means of which the effect of any deviation of temperature and atmospheric pressure from the normal point may readily be neutralized in registering the quantity of gas passed through the meters during the testings.

The starting or unit point in this table is 30 inches for the barometer, and 60° for the thermometer. This is in complete accordance with all the best authorities on gas questions, with the practice at the Royal College of Chemistry, and in all establishments where this accurate mode of calculation is in use. Nevertheless Mr. Heisch alleges that the table is erroneously framed, and that the effect is to do an injustice to the public and to give an advantage to the gas companies.

If Mr. Heisch had more fully understood the subject, he would have known that it is impossible to use such a table in an unfair or one-sided manner, when testings are made both for purity and for illuminating power. If the table were so framed as to give an advantage to the public as regards illuminating power, it must of necessity give an equal advantage to the companies in evading the penalties for impurity; and *vice versâ*. For example, the higher the barometer and the lower the thermometer, the greater is the density of the gas—a cubic foot will then contain more gas, and give more light, than if the temperature were higher and the atmospheric pressure less; but, at the same time (as is obvious from the fact of there being more gas in the cubic foot), there would be more impurity—rendering the companies more liable to penalties.

But even as regards illuminating power, the table gives no advantage to the companies; for since, as required by the referees, the gas gives a light of 14 candles at a temperature of 60°, it must give a still greater amount of light at a lower temperature, like that of the consumers meters—which in the evening may be taken at only 40° or 45° for the winter months, when the greatest consumption of gas takes place, and at 55° or 60° during the summer months. As every 10° of temperature under 60° make a difference of 2 per cent. in the light, or of 20 feet in the 1000 as regards quantity, in favour of the public, and as the barometer must stand more than half an inch below 30 to neutralize that advantage, it is needless to say that the difference between the temperature of consumers meters and that at which the gas is tested by the referees more than compensates the fact that the annual average reading of the barometer barely comes up to 30 inches. Accordingly Mr. Heisch's view of the matter is wholly erroneous, and the calculations which he gives are based upon a mistake.

In regard to his objection to the ammonia test—namely, that the quantity of liquor tested is too small to enable a gas examiner to arrive at certain results—the referees beg to say that, by experiments in their laboratory, they have satisfied themselves that it can be employed with reliable results by any one who is in an ordinary degree practised in chemical manipulation.

The opposite objection taken to the sulphur testing—namely, that the quantity of liquor tested is too large—does not call for any remark. Nor was it necessary for the referees to give any instructions as to the avoidance of draughts of air on the cylinders; for no responsibility of the kind is left to the examiners. The referees, in compliance with the Act, provide that the stations are properly fitted up before they "certify" them, and thereafter it is their duty to inspect them from time to time. It may be added that the sulphur apparatus, as fitted up in the stations, has been approved by its inventor, Dr. Letheby, who is also the chief gas examiner under the Act of 1868.

In regard to Mr. Heisch's general objections relating to the sulphur and ammonia tests, the reports which the referees have had the honour to submit to the Board of Trade render any statement on their part unnecessary. And since, for the reason stated in those reports, the quantity of sulphur compounds (other than sulphuretted hydrogen) is, for a short time, simply to be recorded, it is obvious that the *average* of the results obtained from the two sets of apparatus fitted up in each testing-station is an additional means of ascertaining what are the results which that apparatus is capable of giving.

Mr. Heisch's last objection is, that the forms in which the calculations are to be recorded might be shortened. It is true they might; but the referees consider that it would be exceedingly unwise to depart from the ordinary form, which is simple and intelligible to all. They may add, that the most experienced photometricians—like Dr. Letheby, Mr. Sugg, and Mr. Kirkham—never adopt the method which Mr. Heisch approves, especially as it does not present the same facilities as the ordinary one for revision and the correction of mistakes.

In conclusion, the referees may observe that they have adopted every means for lightening the work of the gas examiners. While prescribing, in accordance with the Act of 1868, the methods of testing and recording to be followed by the gas examiner at each station, they have made their instructions so full, minute, and clear, that even a novice could successfully carry them into execution; and, in order to enable the examiner to make and record his observations and calculations in little time, they supply him with printed sheets in which every part of the work is done for him in skeleton.—I have the honour to remain, &c.,

Office of the Gas Referees, T. Foster, Secretary.
28, New Street, Spring Gardens, May 13, 1869.

Obituary.—Death of James Shepherd, Esq., Gerant of the Anglo-Romano Gas Company.—This respected gentleman died suddenly while undressing on the evening of Friday, the 7th inst., at his residence in Rome, in the 68th year of his age. The gas-works in that city were established by Mr. Shepherd some years since, and he has recently been engaged in carrying out works for the supply of the city with water by a restoration of the old Marcian aqueduct.

Moretonhampstead Gas Company.—At an extraordinary general meeting of the shareholders, held at the White Hart, on Saturday, the 15th inst.—G. N. Collyns, Esq., in the chair—it was resolved that, in order to ensure the most efficient and economical working of the concern, a cottage for a resident manager should be built, and also sheds for coal and coke stores; and in order to carry out this plan, it was further resolved that the capital of the company should be increased from £1250 to £1750, by issue of new shares to the amount of £500, such shares to be offered *pro ratâ* amongst the shareholders, and if not taken up by them, then to be offered to the general public. A most cordial vote of thanks was unanimously passed to the respected engineer of the company, W. Crosley, Esq., for the able, efficient, and economical manner in which he had carried out his duties. The justice of this mark of approbation by the shareholders is conspicuously apparent in the completeness and thorough efficiency of every part of the work, and by the purity and illuminating power of the gas manufactured. It is hoped it will be some small consolation to Mr. Crosley for the difficulties he has had to contend with from various causes during the execution of the work.—*Western Times.*

Register of New Patents.

APPLICATIONS FOR LETTERS PATENT.

1401.—Ernest Seyd, of Princes Street, in the City of London, for "*Improvements in fluid-meters.*" A communication. May 7, 1869.

1405.—John Ramsbottom, of Leeds, in the co. of York, hydraulic engineer, and Thomas Massey Pearce, of Bradford, in the co. aforesaid, wool merchant, for "*Improvements in steam and hydraulic apparatus for pumping, forcing, and measuring water, and for raising weights.*" May 7, 1869.

1429.—John Withers, of Handsworth, in the co. of Stafford, for "*Improvements in water-meters.*" May 10, 1869.

1432.—Baldwin Latham, of 6, Westminster Chambers, Westminster, in the co. of Middlesex, civil engineer, for "*Improvements in ventilators for sewers, also applicable for deodorizing noxious gases arising in the processes of certain manufactures.*" May 11, 1869.

1457.—John Lowe Greatorex, of East Grinstead, in the co. of Sussex, plumber, for "*Improvements in urinals.*" May 12, 1869.

1471.—John Fawcett, of Huddersfield, in the co. of York, tin-plate worker, for "*Improved means or apparatus for measuring oil or other liquids.*" May 13, 1869.

1477.—Isaac Storey and John Henry Storey, both of Manchester, in the co. of Lancaster, brassfounders, and Henry Lea, mechanical engineer, and Thomas Lane, civil engineer, both of Birmingham, in the co. of Warwick, for "*Improvements in means for controlling the discharge of water from stand-pipes, drinking fountains, and ball taps or valves.*" May 14, 1869.

1493.—Louis Antoine Victor Dubourg, of Leicester Street, Leicester Square, in the co. of Middlesex, doctor of medicine, for "*Improvements in the manufacture of gas for lighting and heating purposes, and in the apparatus employed therein.*" May 15, 1869.

1501.—Henry de Garrs, of 2, Summerfield Street, Ecclesall Road, in the township of Ecclesall Bierlow, Sheffield, in the co. of York, brass and wood turner, for "*Improvements in gas-pendants and chandeliers.*" May 17, 1869.

1517.—James Norton, of Sheffield, in the co. of York, lead and glass merchant, for "*Improvements in ball and other cocks, taps, and valves.*" May, 18, 1869.

1522.—John Woodward, of Queen's Foundry, New Islington, Ancoats, in the city of Manchester, in the co. of Lancaster, engineer, for "*Improvements in gas and water meters.*" May 18, 1869.

1557.—Zebulon Erastus Coffin, of Newton Centre, in the state of Massachusetts, U.S.A., for "*Improvements in stop-cocks or valves.*" May 20, 1869.

GRANTS OF PROVISIONAL PROTECTION.

1374.—William Edward Newton, of 66, Chancery Lane, in the co. of Middlesex, civil engineer, for "*Improvements in engines to be used as motors or as pumps for raising or forcing liquid or aëriform bodies.*" A communication. May 4, 1869.

1375.—Alexander Cæsar Frederick Franklin, of Abingdon Street, Westminster, engineer, and Ernest Dubois, of Primrose Street, Bishopsgate, engineer, both in the co. of Middlesex, for "*Improvements in gas-engines.*" May 4, 1869.

1442.—Baldwin Latham, of 6, Westminster Chambers, Westminster, in the co. of Middlesex, civil engineer, for "*Improvements in ventilators for sewers, also applicable for deodorizing noxious gases arising in the processes of certain manufactures.*" May 11, 1869.

NOTICE TO PROCEED.

20.—Samuel Joseph Peet, of Leeds, in the co. of York, for "*Improvements in valves or cocks.*" Jan. 4, 1869.

PATENTS WHICH HAVE BECOME VOID

BY REASON OF THE NON-PAYMENT OF THE ADDITIONAL STAMP DUTY OF £50 BEFORE THE EXPIRATION OF THE THIRD YEAR.

1239.—David Cohen, "*Improvements in dry gas-meters.*" May 2, 1866.

1330.—Samuel Middleton, "*Improvements in the method and means of securing and discharging the contents of pipes and vessels.*" May 9, 1866.

1337.—William Hackett and William Marsden, "*Certain improvements in the construction of water-closets, and in the valves connected therewith.*" May 10, 1866.

1338.—Orlando Brothers, "*Improvements in governors or apparatus for regulating and controlling the pressure and flow of illuminating gas or other gaseous fluids.*" May 10, 1866.

1346.—Julian Bernard, "*Improvements in elevating and forcing water and other fluids, and in the machinery or apparatus connected therewith.*" May 10, 1866.

1348.—Alfred Vincent Newton, "*Improved apparatus for manufacturing illuminating gas.*" May 10, 1866.

1363.—Thomas Jackson Chapman and Thomas Rose, "*Improvements in the construction of water-closets.*" May 12, 1866.

1382.—Walter Payton, "*Improvements in the construction of dry gas-meters, part of which improvements is also applicable to meters for measuring water and other liquids.*" May 15, 1866.

1384.—George Haseltine, "*Improvements in the mode of and means for promoting ventilation.*" May 15, 1866.

A Gentleman, having thorough practical experience as an Engineer, is desirous of obtaining a situation as MANAGER of Works. Gas preferred.

Address "MANAGER," at Deacon's, LEADENHALL STREET.

AN Engineer, anxious to settle in the Colonies, would be disposed to SUPERINTEND the erection of any works on a large scale at a very moderate rate.

Address "ENGINEER," at Deacon's, LEADENHALL STREET.

TO GAS COMPANIES AND PROPRIETORS.

THE Advertiser, who holds an appointment in one of the London gas companies, wishes to meet with an ENGAGEMENT in some provincial company. Is of good business habits, and thoroughly acquainted with the distribution of gas, meter inspecting, accounts, collecting, and the general routine of a gas office. Security if required.

Address H. L., care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, at Midsummer next, by the Cambridge University and Town Gaslight Company, a MANAGER, thoroughly acquainted with the manufacture of gas, and competent to superintend the entire management of the gas-works (the make of gas being near 100 million cubic feet per annum) and keep the accounts of the company. Salary £150 per annum, with house, coals, gas, and water free.

The person selected must be prepared to enter into a bond with two sufficient sureties for £500.

Sealed applications, with names and addresses of sureties, references, and testimonials of a recent date, to be forwarded to the undersigned on or before the 2nd day of June next.

By order of the Directors,
WILLIAM PERD, Secretary.

Cambridge, May 21, 1869.

CANTERBURY GAS & WATER COMPANY.

TO GAS ENGINEERS & MANAGERS.

WANTED, a Manager, competent to take charge both of the Gas and Water Works of this Company. He must be thoroughly acquainted with the manufacture of gas upon the most approved principles, and fully capable of designing and superintending the reconstruction of any portion of the works, the main-laying, and distribution of both gas and water.

Present salary £150 per annum, with residence (containing 8 rooms), coals, and gas.

Applications, stating age, present and previous occupations, accompanied by testimonials of recent date, not exceeding four in number, to be delivered at the Secretary's Office, Castle Street, Canterbury, on or before Thursday, the 3rd of June next.

By order of the Board,
JAMES BURCH, Secretary.

Canterbury, May 22, 1869.

IN CHANCERY.—In the Matter of the Companies Acts, 1862 and 1867, and in the Matter of the City of Moscow Gas Company, Limited.—The CREDITORS of the above-named Company are required, on or before the 1st of June, 1869, to send their names and addresses, and the particulars of their debts or claims, and the names and addresses of their solicitors, if any, to Joseph Silvester Godfrey and Arthur Cooper, Liquidators of the said Company, at the Offices of Messrs. Cooper, Brothers, and Co., No. 13, George Street, Mansion House, in the City of London; and, if so required by notice in writing from the said Liquidators, are, personally or by their solicitors, to come in and prove their debts or claims at No. 13, George Street, Mansion House aforesaid, at such time as shall be specified in such notice; or, in default thereof, they will be excluded from the benefit of any distribution made before such debts are proved. The 15th day of June, 1869, at Eleven o'clock in the forenoon, at 13, George Street aforesaid, is appointed for hearing and adjudicating upon the debts and claims, as the Liquidators may require to be proved as aforesaid. —Dated this 19th day of April, 1869.

J. S. GODFREY, ARTHUR COOPER, } Liquidators.

Upton, Johnson, and Upton, 20, Austinfriars, London, Solicitors for the Liquidators.

FRENCH BRONZE STATUETTES AND FIGURES FOR GAS.

A Choice Assortment of the above always on show at CORBIERE & SONS, 30, Cannon Street, LONDON, E.C.

O'NEILL'S NATURAL HYDRATED PEROXIDE OF IRON is acknowledged to be the best in the market. It contains 90 per cent. of pure Oxide, is light, permeable, and perfectly free from grit and other deleterious ingredients. Now used exclusively in several of the largest London and provincial gas-works.

JOHN WM. O'NEILL and Co., 57, Bishopsgate Street Within, LONDON, E.C.

W. J. SIMMONDS,

Retort and Boiler Setter and Contractor for Gas-Works in general,

7R, SOUTH STREET, NEW NORTH ROAD, ISLINGTON, LONDON, N.

Upwards of 16 years Retort Setter to the Chartered Gas Company, Brick Lane and Curtain Road Stations.

Materials supplied on reasonable terms if required, or labour only.

No connexion with any other Retort Setter.

N.B.—Orders to be addressed as above.

BRITISH ASSOCIATION OF GAS MANAGERS.

THE SIXTH ANNUAL GENERAL MEETING OF MEMBERS
WILL BE HELD ON THE
1st, 2nd, and 3rd of June, 1869,
AT THE
ROYAL INSTITUTION, COLQUIT STREET, LIVERPOOL.

E. GODDARD, ESQ., C.E.,
President of the Association, will occupy the Chair, and deliver the
INAUGURAL ADDRESS.

The following Papers and Communications will be submitted to the Meeting:—

"On Charging and Discharging Retorts by Machinery,"
By Mr. GEORGE ANDERSON, London.

"On a Substitute for the Hydraulic Main,"
By Mr. WILLIAM ESSON, Cheltenham.

"On Self-Acting Apparatus for Lighting and Extinguishing,"
By Mr. JAMES ELDRIDGE, Richmond, Surrey.

"On Breeze and Tar Fuel,"
By Mr. GEORGE ANDERSON, London.

"On Means for Preventing an Escape when Drilling and Tapping Gas and Water Mains,"
By Mr. ALFRED UPWARD, London.

"On a Registering Durability Test,"
By Mr. WILLIAM ESSON, Cheltenham.

"On Unleakable Joints for Gas and Water Mains,"
By Mr. C. M. BARKER, London.

"On Nuisances arising from the Manufacture of Gas,"
By Mr. R. H. JONES, Dover.

"On Gas-Burners,"
By Mr. WILLIAM SUGG, London.

A LECTURE will be delivered at Seven P.M., on TUESDAY, JUNE 1,
By ALFRED G. ANDERSON, Esq., Professor of Practical Chemistry at Queen's College, Birmingham,
"On some New Contributions to the Chemical and Technical History of Coal Gas."

THE ANNUAL DINNER
Will be held on WEDNESDAY, JUNE 2, at the Adelphi Hotel, Liverpool, at Five P.M.

WILLIAM H. BENNETT, Hon. Sec., *pro tem.*

May 14, 1869.

EASTBOURNE, SUSSEX.

TO TIMBER, CORN, & COAL MERCHANTS, MILLERS, GAS COMPANIES, SPECULATORS, AND OTHERS.

VALUABLE FREEHOLD LAND AND BUSINESS PREMISES,
Suitable for Steam Saw Mills or Flour Mills, Timber, Coal, or Corn Merchants, and others, with immediate possession.

WALLIS and WALLIS are instructed by the Directors of the Eastbourne Gas Company to SELL BY AUCTION, at Diplock's Assembly Rooms, Terminus Road, in Eastbourne aforesaid, on MONDAY, the 26th day of July next, at Two o'clock in the afternoon precisely, the following PROPERTY, in Three Lots:—

Lot 1 will consist of a capital Iron GASHOLDER, calculated to contain 30,000 cubic feet of gas, with the cast-iron columns and girders belonging to the same.

Lot 2.—A smaller GASHOLDER, calculated to contain 10,000 cubic feet of gas, with the cast-iron columns and girders thereto.

Lot 3.—All that piece of FREEHOLD LAND, forming the site of the Old Gas-Works in Eastbourne, containing 2800 square yards, abutting on the south side thereof upon the London, Brighton, and South-Coast Railway, and having a siding leading therefrom into the same; together with a right of way, 20 ft. wide, leading from the premises into the High Road near the Railway Station; together, also, with the COTTAGE and RETORT-HOUSE, having a nearly new chimney-shaft, about 75 ft. high, with copper lightning conductor, brick-built coal-stores, meter-house, and lime-house, and all other erections now standing thereon, with the two brick tanks for the gasholders, tar-tank, &c.

Particulars and conditions of sale may be obtained, 14 days prior to the sale, of the AUCTIONEERS, and of Mr. J. H. C. COLES, Solicitor, EASTBOURNE, and at the principal Inns in the neighbourhood.

D. BRUCE PEEBLES,
Gas-Meter Manufacturer,
FOUNTAINBRIDGE
EDINBURGH.

TAR AND AMMONIACAL LIQUOR FOR SALE.

THE Directors of the Blackburn Gaslight Company are prepared to receive TENDERS for the purchase of all the TAR and AMMONIACAL LIQUOR to be produced at their works for a term of Three or Four years, from the 1st of July, 1869.

Printed conditions and other information may be obtained on application to the undersigned.

Tenders to be sent in on or before the 8th of June next.

ORLANDO BROTHERS, Engineer and Manager.
Gas-Works, Blackburn, May 15, 1869.

TO TAR DISTILLERS.

THE Directors of the Tottenham and Edmonton Gaslight and Coke Company are prepared to receive TENDERS for the TAR produced at their works for One year, from the 1st of July, 1869. Quantity about 80,000 gallons.

Tenders to be sent in to the Secretary, at the Company's Offices, Willoughby Lane, TOTTENHAM, on or before Thursday, June 3.

The Directors do not bind themselves to accept the highest or any tender.

JAMES RANDALL, Secretary.

May 24, 1869.

TO PIPE-LAYERS.

THE Directors of the Canterbury Gas and Water Company are prepared to receive TENDERS, "Contract No. 3," for laying upwards of Four Thousand yards in length of 12-in. cast-iron SOCKET MAIN-PIPES, with branches for connecting smaller pipes, screw-cocks, hydrants, and other appendages connected therewith. The 12-in. pipes to be laid from the site of the New Water-Works, situated in the parish of Thannington, near Wincheap, in the city of Canterbury, and from thence along or under the high roads and streets in a north-easterly direction as far as the High Street, in the city of Canterbury, and from thence in a north-westerly direction along or under the High Street, St. Peter's Street, St. Dunstan's, in the said city, and the High Road, near to the top of St. Thomas's Hill.

The specification may be seen, and forms of tender obtained, by intending Contractors, on and after Monday, the 17th inst., at the Offices of the Company, Castle Street, Canterbury; and at the Office of Mr. S. C. Homersham, 19, Buckingham Street, Adelphi, London, the Engineer to the Water-Works.

The lowest or any tender will not necessarily be accepted.

Sealed tenders, endorsed "Contract No. 3," to be addressed to the Secretary, and delivered at the Company's Office, Castle Street, Canterbury, on and after Thursday, the 27th of May inst.; and the Directors will meet the following day at Ten A.M. to consider the same.

By order,
JAMES BURCH, Secretary.

Canterbury, May 10, 1869.

TENDERS FOR TAR.

THE Directors of the Great Central Gas Company are prepared to receive TENDERS for the TAR manufactured at their works for the year ending July 1, 1870.

Particulars as to quantity and delivery may be obtained on application to the MANAGER, at the Works, Bow COMMON, E.

Tenders to be sent to the Office of the Company, 28, Coleman Street, E.C., on or before Wednesday, June 9, 1869.

May 17, 1869.

WALTON-ON-THAMES AND WEYBRIDGE GAS-WORKS.

TENDERS are invited for the supply and erection of Cast and Wrought Iron Work, in Retort Fittings, Condenser, Scrubber, and connexions.

The drawings and specification may be seen, and (on payment of 10s.) the weights and quantities may be obtained, at the Offices of the Engineer, Mr. G. W. STEVENSON, 19, Great George Street, WESTMINSTER, on and after Thursday, the 27th inst.; and tenders must be sent to EDWARD HENRY JOHN CRAUFURD, Esq., M.P., one of the proprietors of the works, at 89, BELGRAVE ROAD, S.W., on or before Thursday, the 3rd of June.

PURIFIERS FOR SALE.

A Set of Four Cast-Iron Purifiers, 8 ft. by 5 ft., with wrought-iron lids, cast-iron centre-valve, connecting-pipes, and lifting apparatus complete.

For further particulars apply to Mr. J. HEPWORTH, the Gas-Works, BRIGHOUSE.

THE Directors of the Crewkerne Gas and Coke Company have FOR SALE two small GASHOLDERS of about 3000 cubic feet capacity each, with columns, girders, and counterbalance weights.

Proposals to be made to Mr. POPE, the Company's Manager, at the Gas-Works, CREWKERNE.

CONTRACT FOR HYDRAULIC MAIN AND PURIFIERS.

THE Directors of the Holbeach Gas and Coke Company, Limited, are prepared to receive TENDERS for supplying and erecting on their works a HYDRAULIC MAIN, about 35 ft. long, D shape, 14 in., for 13 retorts, H pipe not less than 4 in. bore; and Two or Three PURIFIERS, about 8 ft. by 4 ft., or 6 ft. square, with 6-in. connexion, and lifting tackle complete. Second-hand would not be objected to, if perfect.

Tenders must be sent to the Clerk, at the Company's Office, in Holbeach, before six p.m. on Friday, the 11th of June next.

The directors do not bind themselves to accept the lowest or any tender.—By order,

RICHARD CAPARN, Clerk.

Holbeach, May 6, 1869.

C. & W. WALKERS'
WOOD SIEVES FOR PURIFIERS.

These justly celebrated Sieves, with bevel bars and hard-wood side frames, have been extensively made by Messrs. Walker for over seven years, and their advantages and durability are fully established. Messrs. Walker make them in very large quantities, having mills and machinery specially laid out for them, producing them at the most moderate cost.

MIDLAND IRON-WORKS,
DONNINGTON, NEAR NEWPORT, SHROPSHIRE.
8, FINSBURY CIRCUS, LONDON, E.C.

THE MALTA & MEDITERRANEAN GAS COMPANY, LIMITED.

NOTICE is hereby given that the ORDINARY GENERAL MEETING of the SHAREHOLDERS of this Company will be held at the London Tavern, Bishopsgate Street, on WEDNESDAY, the 2nd of June next, at Twelve o'clock precisely.

At this Meeting will be presented the report of the Directors (containing their recommendation of a Dividend), and the Accounts of the Company for the twelve months ended the 31st of March last.

The Directors retiring are Wm. Nicol, Esq., and Lord Alfred Hervey, who are eligible for re-election.

The Transfer Books will be closed from the 26th inst. to the 2nd of June inclusive.

By order,
E. P. ROWSELL, Secretary.
60, Gracechurch Street, May 13, 1869.

THE HUCKNALL COLLIERY

COMPANY can offer a CANNEL COAL yielding a large quantity of Gas of superior quality.

Prices and information on application to the HUCKNALL COLLIERY COMPANY, Hucknall Torkard Collieries, near NOTTINGHAM.

THOMAS CARR & SON,

MANUFACTURERS OF
FIRE-BRICKS, LUMPS, TILES, RETORTS, &c. &c.
SCOTSWOOD FIRE-BRICK WORKS,
NEAR
BLAYDON-ON-TYNE.

ALFRED PENNY, Gas and

CONSULTING ENGINEER,
WENLOCK IRON WORKS,
21, WHARF ROAD, CITY ROAD, LONDON.

Mr. PENNY having had a large experience in the construction, alteration, and management of Gas-Works, begs to inform the Directors of Gas Companies that he may be consulted on all matters appertaining thereto. He also manufactures Gasholders, Purifiers, and all the various apparatus used in Gas-Works, and keeps in stock Retorts and Mouthpieces, Socket-Pipes, Bends, Branches, T-pieces, &c. &c.

Plans, Specifications, and Estimates prepared.

F. SIMMONDS, Senr.,

221, KINGSLAND ROAD,
RETORT & BOILER SETTER

For the Chartered Gaslight Company, Brick Lane and Curtain Road Stations, and numerous Gaslight Companies, London and Provincial.

NO CONNEXION WITH ANY OTHER RETORT SETTER.
Estimates given with or without materials.

HENRY F. WILLEY,

GAS ENGINEERING WORKS,

BARTHOLOMEW STREET, EXETER,

Tenders his grateful acknowledgments to kind Patrons and Friends for their support during the past Twelve months, which he accepts as a tribute of respect for his industry directed in another sphere for FIFTEEN YEARS. Since his commencement in business he has erected and completed THREE entire NEW GAS-WORKS in the West of England, and from each town has received the most gratifying Testimonials for the satisfactory manner in which the works have been executed.

He invites particular attention to his

GAS-METER DEPARTMENT,

Where he manufactures both WET and DRY METERS, and states with pleasure that he has sent out in England, Ireland, and Wales over

700.

(*Vide* the Inspector of the City of Exeter's Stamping Fee Account.) These Meters have received the highest praise from many eminent Gas Engineers, for their excellence of manufacture, superiority of workmanship, and accuracy of register. They are warranted to measure correctly and not to vary. Every Meter manufactured by him maintained in perfect repair for a period of *five years*. All bear the Government stamp.

GAS-FITTING DEPARTMENT.

A variety of very beautiful and choice patterns and designs adapted for any character of buildings, including MEDIÆVAL FITTINGS for CHURCHES, &c.; Handsome STAR PENDANTS for ASSEMBLY ROOMS, &c.; CHANDELIERS, PENDANTS, BRACKETS, &c.

ENGINEERING DEPARTMENT.

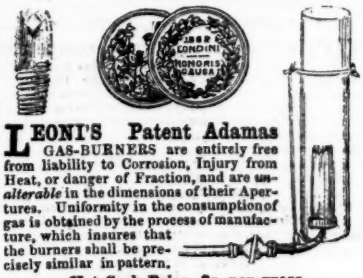
Every description of GAS APPARATUS, comprising GASHOLDERS, STATION-METERS, GOVERNORS, CONDENSERS, PURIFIERS, RETORTS, SLIDE-VALVES, and every article appertaining to Gas-Works.

Gas Companies advised on Improvements, Extensions, and Alteration of Works.

*** The very best material and workmanship guaranteed, and at prices bearing a favourable comparison with any House in the Kingdom.

UNIVERSAL PARIS EXHIBITION, 1867.

PRIZE MEDAL in Class 24—Heating and Lighting—for Leoni's Patent Gas-Burners and Gas-Stoves.



LEONI'S Patent Adamas GAS-BURNERS are entirely free from liability to Corrosion, Injury from Heat, or danger of Fraction, and are *unalterable* in the dimensions of their Apertures. Uniformity in the consumption of gas is obtained by the process of manufacture, which insures that the burners shall be precisely similar in pattern.

Net Cash Price, 8s. per gross.

Patentee and Sole Manufacturer, S. LEONI, 34, St. Paul Street, New North Road, LONDON, N.

FOR SALE,

SEVERAL SECOND-HAND STATION-METERS & GOVERNORS,

All in excellent Working Order, equal to New, guaranteed.

APPLY FOR FURTHER PARTICULARS TO

GEORGE RAIT, Managing Director, GAS-METER COMPANY,
238, KINGSLAND ROAD, LONDON, N.E.;
OR TO
WILLIAM ARCHER, THE OLDHAM METER MANUFACTORY, OLDHAM.

LIVESEY FIRE-CLAY WORKS,

NEAR BLACKBURN, LANCASHIRE.

ORLANDO BROTHERS,

MANUFACTURER OF PATENT CLAY RETORTS,
AND EVERY DESCRIPTION OF
TUBULAR GLAZED SEWERAGE PIPES, BENDS, JUNCTIONS, ETC.
FIRE-BRICKS, TILES, BLOCKS, AND CHIMNEY-TOPS.

PATENT IMPROVED
CAST-IRON CASED DRY GAS-METER

(*Drawings on application*).

FULLERTON, SON, & CO., ABBEY MOUNT WORKS, EDINBURGH.

Station-Meters and Gas Apparatus, Consumers Wet Gas-Meters in Cast-Iron, and Dry in Tin Plate Cases.

LEONI'S

PATENT PORTABLE, ECONOMICAL,

ATMOSPHERIC GAS-STOVES,

FOR HEATING, COOKING, BROILING, GRILLING, &c.;

Also AUTOMATIC, for ROASTING, BAKING, &c.

One gallon of water boiled in 15 minutes; consumption 4 feet of gas.
One steak or chop grilled *under* the heat-reflector and one *over* it, both in 10 minutes; consumption one 2-10ths foot of gas.
One chicken roasted in 1 hour; consumption 7½ feet of gas.
A joint of 3 lbs. roasted in 1 hour; consumption 12 feet of gas.
One pound of potatoes baked in 40 minutes over the heat-reflector while broiling is going on underneath.
One complete dinner for 12 persons cooked in 2 hours; consumption 15 feet of gas.

The AUTOMATIC GAS-STOVE is made in several sizes, to roast from 5 lbs. up to several hundredweight of meat, is quite self-acting, and requires no attention whatever.

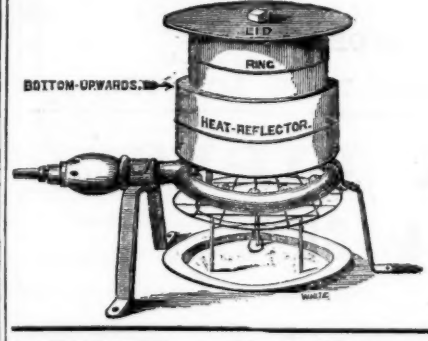
Six pounds of beef roasted in 1 hour; consumption 20 feet. Four quartern loaves of bread baked in 1 hour; consumption 20 feet. During the baking a joint, fowl, &c., may be roasted under the gas-ring.

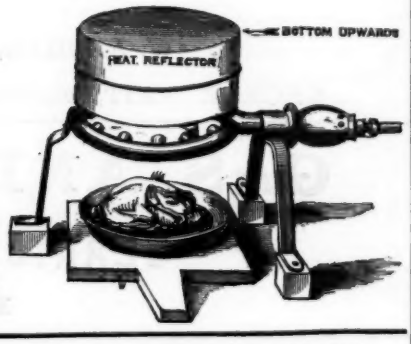
For prices and particulars, apply to S. LEONI, 34, St. Paul Street, New North Road, London, N.

☞ During the Horse Show, Mr. Leoni's Gas Apparatuses are exhibited, and may be seen in action, at the Bazaar in the Agricultural Hall, where he will personally attend between the hours of Eleven A.M. and One P.M., or at other times by special appointment. Mr. Leoni solicits a visit from proprietors, directors, and engineers of gas-works.

Extract from the "JOURNAL OF GAS LIGHTING, WATER SUPPLY, & SANITARY IMPROVEMENT," Feb. 16, 1869.

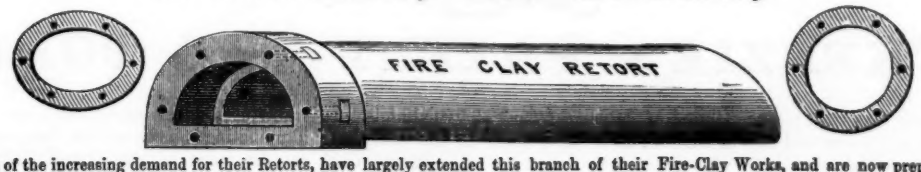
"Any contrivance which facilitates and economizes the use of gas for heating and cooking purposes deserves the encouragement of gas companies, and none that have come under our notice seem to effect that object *so completely* as Leoni's Portable Atmospheric Heating and Cooking Gas-Stoves, with which we have made some satisfactory experiments. One peculiarity of the apparatus is, that the processes of broiling and roasting are conducted by *reflection only* of the heat, which method has great advantages over the direct application of the heat of a gas-flame. The apparatus was tried with great success at the Paris Exhibition, and the economical results, as recorded, were much in favour of the use of gas, independent of its other advantages. It is stated that a complete dinner for twelve persons was cooked in two hours, with a consumption of only 15 feet of gas. These stoves have been found equally effective in heating apartments, and they produce no unpleasant sensation of closeness."





THE FARNLEY IRON COMPANY,

FARNLEY, near LEEDS,



In consequence of the increasing demand for their Retorts, have largely extended this branch of their Fire-Clay Works, and are now prepared to execute the most important orders, either for *home* or *export*, with great punctuality.

The Fire-Clay raised from the Farnley Estate (commonly called the Wortley bed) is unsurpassed by any other known in the district, and is peculiarly well adapted for Retorts, Gas-Ovens, and Fire-Bricks; and the F. I. Co. beg especially to invite those connected with Gas-Works, who have not yet used their Retorts, to be good enough to favour them with a trial.

The F. I. Co. generally hold in stock, for immediate supply, Fire-Bricks of every size and kind—Tiles, Sanitary Tubes, Ornamental Terra-Cotta Ware White Facing Bricks, the White, Buff and Salt-Glazed Bricks, &c., &c.

Prices, Drawings, and all other information may be obtained by applying as above, or to

MR. SUTTON, THE HULL STORES, 46½, QUEEN STREET, HULL.

DRY GAS-METERS IN CAST-IRON CASES,

MANUFACTURED BY

WILLIAM AND BENJAMIN COWAN,

(ESTABLISHED 1827,)

BUCCLEUCH STREET WORKS, EDINBURGH,

Possess a simplicity of construction and facility for repair greater than any yet produced, while the excellence of the material and workmanship, and accuracy of registration, cannot be surpassed. The superiority of their Dry Meters in Tin Cases is also well known.

SOLE MANUFACTURERS OF

ESSON'S PATENT COMPENSATING GAS-METERS.

COWAN'S PATENT SIDE-VALVE GAS-METERS.

GEORGE NEWTON,

(Late Senior Partner of the Globe Meter-Works,)

UNION STREET WEST, OLDHAM,

MANUFACTURER OF

IMPROVED WET & DRY CONSUMERS GAS-METERS,

GAS STATION-METERS,

With all the Joints planed,

GOVERNORS, GAUGES, INDICATORS, EXHAUST GOVERNORS, &c.

TERMS, &c., ON APPLICATION.

THE GAS-METER COMPANY

(LIMITED), LONDON,

(Successors to CROLL, RAIT, and CO., LONDON, and WEST and GREGSON, OLDHAM.)

MANUFACTURE

STATION-METERS & GOVERNORS

At their Oldham Establishment, which has long possessed the reputation of supplying this description of apparatus of the most perfect construction and appropriate design.

CONSUMERS GAS-METERS IN CAST-IRON & TINNED SHEET-IRON CASES.

STREET GOVERNORS, PRESSURE and EXHAUST REGISTERS, TEST GASHOLDERS,

AND EXPERIMENTAL GAS APPARATUS GENERALLY.

For information, &c., apply to

W. ARCHER, Manager, Meter Factory, OLDHAM;

OR TO

GEORGE RAIT, Managing Director, KINGSLAND ROAD, LONDON.

GAS AND WATER PIPES.

CLARIDGE, NORTH, & CO.,

BILSTON.

M'KENZIE'S PATENT GAS COAL.

This Patent Gas Coal is a compound of Pulverized Coal and Shale Oil. It is now used most successfully by some of the London Gas Companies, and also in Dublin and other places, for increasing the illuminating power of the Gas, which it does at less cost than Cannel Coal. The illuminating power of this Patent Coal can be made of any strength required up to 35 candles, and is in all cases guaranteed. The Coke is of the best quality, as the best Newcastle and Sunderland Coals only are used in the manufacture.

This Patent Coal is shipped at Sunderland, where works for its manufacture have been erected.

Further particulars can be obtained from

W. W. JOBSON, 16, Fish Street Hill, LONDON; or

WALKER, BRUCE, & CO., Patent Gas-Coal Works, South Docks, SUNDERLAND.

EXTRACT *from the Inaugural Address of* THOMAS G. BARLOW, Esq., C.E., *President of the British Association of Gas Managers, at their Fifth Annual General Meeting, held in London on the 2nd of June,* 1868.

Gentlemen,—In considering the progress that has been made in the manufacture and distribution of Gas during the past year, the new inventions and new processes which have been adopted or tried with prospect of success, deserve to be specially noticed. Foremost among them is M'Kenzie's process for producing Gas of high illuminating power from small Coal, mixed with crude Shale Oil. The pressure which the Legislature has recently put on Gas Companies to raise the standard of illuminating power considerably above that obtainable from common Coal, has compelled most of them to use a certain proportion of Cannel Coal, at a heavy loss, and with a diminution in the value of the Coke. The advance in the price of Cannel Coal, consequent on the increased consumption, has stimulated inquiry to find a substitute for it; and this seems to have been accomplished by Mr. M'Kenzie, whose process has been successfully adopted on a large scale at the Alliance Gas-Works in Dublin. The small Coal is well mixed with the Oil, in the proportions varying from 10 to 30 gallons of Oil to one ton of Coals. This is effected by means of a mixing or grinding mill. The Compound material is then distilled in ordinary Gas Retorts of clay or iron, at a strong heat. I have recently witnessed an experiment on a mixture of Llantwit Small Coal shipped at Cardiff, and costing in Dublin 12s. 6d. per ton, with 5 per cent. of Broxburne Shale Oil, costing £5 10s. per ton, the produce of the distillation of one ton of which mixture was—

9750 cubic feet of Gas, 21·5 Candles illuminating power.
37 bushels of good hard, saleable Coke.
2 bushels of Breeze.
11 gallons of Tar.
15 gallons of Ammoniacal Liquor, of 5° Twaddle.

The cost of this mixture, including Royalty, was about 17s. per ton, against 24s. for Wigan Cannel, over which it has the advantage of at least 5s. per ton in the value of the Coke.

INTERNATIONAL EXHIBITION, 1862. CLASS X.

PRIZE MEDAL

For excellence of Fire-Clay Gas Retorts, and "HONOURABLE MENTION" for good quality of Fire-Bricks.

WILLIAM STEPHENSON & SONS,
THROCKLEY,
NEWCASTLE-ON-TYNE.

JAMES NEWTON & SONS,
(Established 1820,)
FIRE-BRICK AND TILE MERCHANTS,
Wholesale and for Exportation,
FALCON DOCK, 78 AND 79, BANKSIDE,
SOUTHWARK, LONDON, S.E.,
DEPÔT for STOURBRIDGE AND NEWCASTLE FIRE-BRICKS, LUMPS, TILES, and FIRE-CLAY, and every Article suitable for
GAS AND WATER WORKS.

HANCOCK'S INDIA-RUBBER GAS-TUBING.

All sizes, from ⅛ in. to 4 in. diameter and upwards.
Also,
HORSE SINGEING APPARATUS, best make, with GAS-BURNERS, COMBS, and INDIA-RUBBER TUBING, all complete.
INDIA-RUBBER BAGS for GAS-MAINS.
WASHERS for GAS and STEAM JOINTS.
VALVES (pure solid Rubber) for STEAM-ENGINES.
PACKING (Elastic) for STEAM-ENGINES.
FLANGE TUBING, for excluding Draughts and Dust through WINDOWS, DOORS, and GLASS CASES.

Section.

Illustrated Price Lists on application.

JAMES LYNE HANCOCK,
Vulcanized India-Rubber Works,
GOSWELL MEWS, AND 266, GOSWELL ROAD
LONDON, E.C.

Established 1811.

READY & SON,
BILSTON STREET BRASS FOUNDRY,
WOLVERHAMPTON,
MANUFACTURERS OF
SUN BURNERS, GAS CHANDELIERS,
HALL LANTERNS, BRACKETS, PENDANTS,
And every Description of
GAS-FITTINGS,
Including
MEDIÆVAL FITTINGS for CHURCHES, &c.

Large Pattern Books complete, with Book of Prices, 7s. 6d.

STOURBRIDGE FIRE-CLAY WORKS.

E. BAKER & CO.,
24 WHARF, NARROW ROAD, PADDINGTON, W.

FIRE-BRICKS, LUMPS, SQUARES, and TILES of all dimensions.
GAS-RETORTS always in stock.
GARDEN EDGINGS of various patterns.
ORNAMENTAL BUILDING BRICKS.
GRATE BACKS in various designs.
Contracts entered into to set Retorts, erect Furnaces, &c.
Shipments on the shortest notice.
Makers of A. C. FRASER'S Patent Ribbed Retorts and Brick Ovens.

HOPKINS, GILKES, & CO.,
LIMITED,
MIDDLESBOROUGH,
SUPPLY GAS AND WATER PIPES OF EVERY SIZE,
Plain, Turned and Bored, and Coated.
CAST-IRON RETORTS.
Castings for Gas-Works of every description.
EXHAUSTERS.
LONDON OFFICE: 95, CANNON STREET.

TO INVENTORS AND PATENTEES.

MR. W. H. BENNETT, having had considerable experience in matters connected with Gas, Water, and Sanitary Improvement, begs to say that he continues to assist Inventors in the perfection of their designs, and to obtain for them PROVISIONAL PROTECTION, whereby their invention may be secured for Six Months; or LETTERS PATENT, which are granted for Fourteen Years.
Patents completed, or proceeded with at any stage, thereby rendering it unnecessary for persons resident in the country to visit London.
Patents procured for Foreign Countries.
Information as to cost, &c., supplied gratuitously upon application to the advertiser, 42, Parliament Street, WESTMINSTER. [Office of the JOURNAL OF GAS LIGHTING, &c.]

Trade Mark. THE MEDAL FOR 1862.

THE ONLY PRIZE MEDAL AWARDED FOR TUBES AND FITTINGS.

CROWN TUBE-WORKS,
WEDNESBURY STAFFORDSHIRE.
WAREHOUSE—81, UPPER GROUND ST., LONDON.
JAMES RUSSELL & SONS,
Patentees and First Makers of Wrought-Iron Tubes.

TO GAS COMPANIES AND THE TRADE.

J. DEFRIES & SONS,
MANUFACTURERS OF
CRYSTAL, BRONZED, & ORMOLU CHANDELIERS;
IMPROVED CRYSTAL STAR & SUN LIGHTS;
VESTIBULES,
IRON BARREL, COMPOSITION TUBING,
AND
GAS-FITTINGS OF EVERY DESCRIPTION.

WORKS:
LONDON, BIRMINGHAM, AND PARIS.

REGISTERED CRYSTAL CHANDELIER.

Special Designs prepared in perfect accordance with architectural arrangements. Estimates furnished for the Lighting and Fitting up of Theatres, Music-Halls, and Public or Private Buildings with Gas.
GAS MOONS OF THE NEWEST DESIGNS.
The Patent Gas-Regulator & Purifier reduced to 6s. 6d. per Dozen.
Pattern Books of Gas-Fittings, Crystal and Ormolu Chandeliers for 1869, are now complete.

CITY SHOW-ROOMS & MANUFACTORY,
147, HOUNDSDITCH.

J. T. B. PORTER & CO.,
GAS ENGINEERS,
MANUFACTURERS AND CONTRACTORS FOR GAS-WORKS
Of any extent at Home and Abroad,
GOWTS BRIDGE WORKS, LINCOLN,
AND
JOHN STREET, ADELPHI, LONDON, W.C.

ROBERT MACLAREN and CO.,
EGLINTON FOUNDRY, GLASGOW,
Manufacturers of all sizes of Cast-Iron Main Pipes, by an improved Patent. General Ironfounders, Gas Engineers, and Wrought-Iron Tube Makers.

TO GAS ENGINEERS AND FITTERS.

Every Description of
GAS LANTERNS & REFLECTOR LAMPS
For Shop Windows kept in Stock.
W. DAVIS, 17, Wells Street, Oxford Street, LONDON, W.
Established 1820.

BECK'S
PATENT SLUICE & FIRE COCKS,
HYDRANTS, STEAM-FITTINGS,
PUMPS, FIRE-MAINS, &c.,
Suitable for Public Buildings, Warehouses, and Dwelling Houses.
A competent person sent to receive particulars for Plans and Estimates.

BECK & COMPANY,
LIMITED,
Brass Founders, Hot-Water & Hydraulic Engineers,
180, GREAT SUFFOLK STREET,
SOUTHWARK, LONDON.

CATHELS'S Patent District Dry Gas GOVERNOR is the only perfect self-acting contrivance for regulating the pressures in the higher levels of a district.
For prices, &c., apply to the Manufacturers, Messrs. GUEST AND CHRIMES, ROTHERHAM.

CATHELS'S Patent Four-way Disc GAS-VALVE—ONE OF WHICH SERVES AS THREE ORDINARY VALVES—is the best Valve for gas-works.
For prices, &c., apply to the Manufacturers, Messrs. GUEST AND CHRIMES, ROTHERHAM.

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To the superiority of their
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Illuminating power rather over	21 sperm candles.
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The actual working, as reported by one of the largest gas companies in Yorkshire, gives results still more favourable, viz—

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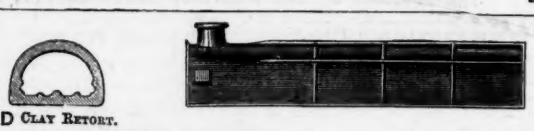

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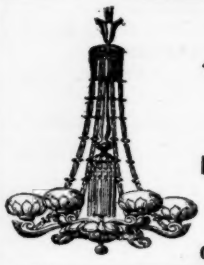

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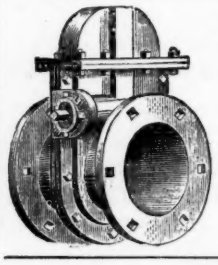

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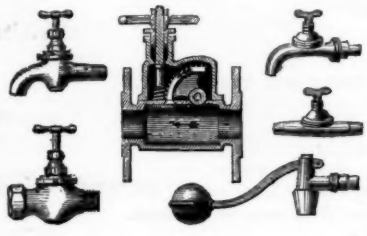

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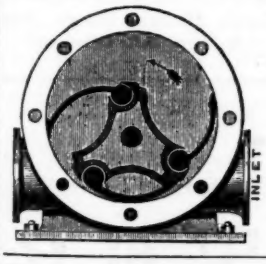

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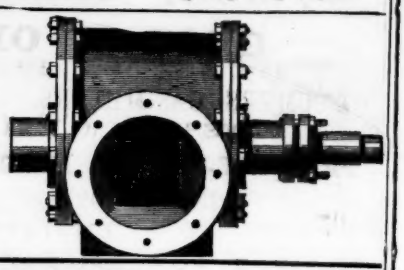

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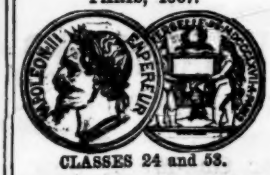

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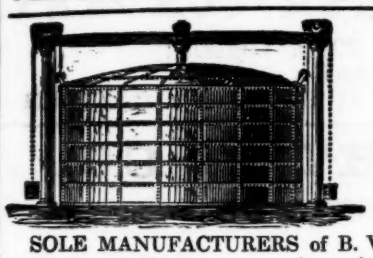

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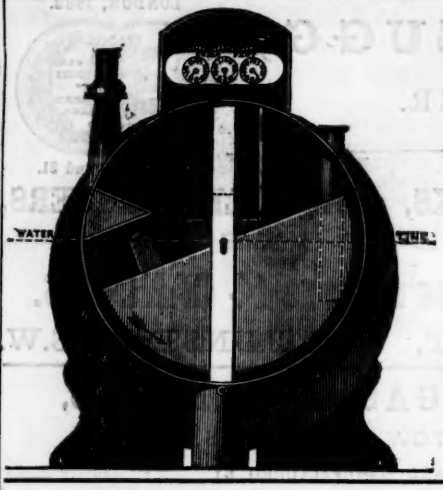

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